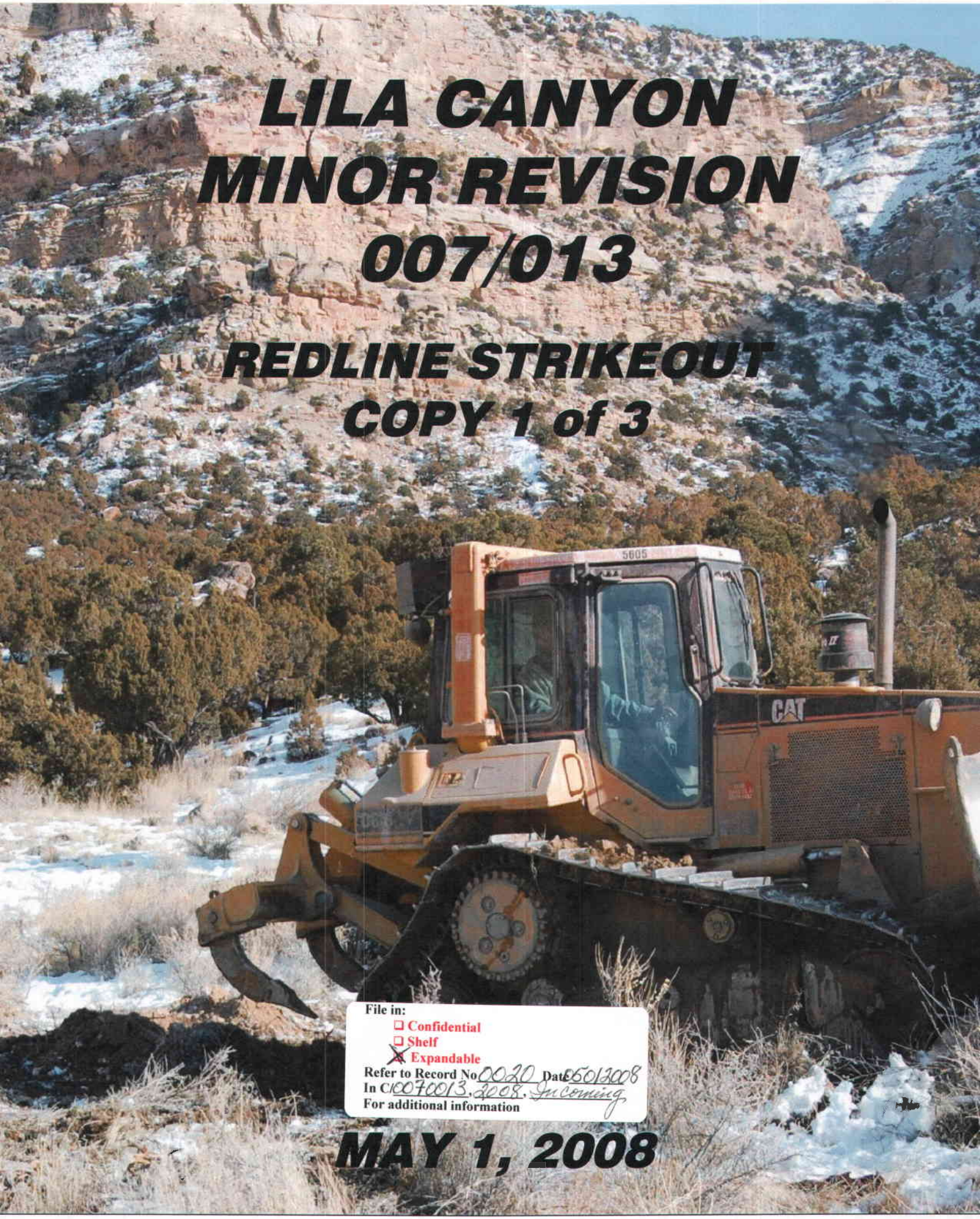
LILA CANYON MINOR REVISION 007/013

REDLINE STRIKEOUT COPY 1 of 3



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chapter 1

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116. Permit Term.

116.100. The anticipated starting and termination dates of the coal mining and reclamation operation are as follows:

Phase	Begin	Complete
Mining Pad, Support Structures, and Portals	June 2005	Dec. 2005
Begin Underground work	June 2005	
Terminate Mining	Dec. 2019	

Reclamation operation dates can be found in Table 3-3.

Approximately 5,992.07 surface acres, which include federal, state and private lands are included within the permit area. These surface acres are described in Table 4-2, and coal acres are shown on Table 4-2A.

The perimeter of the disturbed area contains approximately 42.6 surface acres within the disturbed area but only ~~25~~33.39 acres will be disturbed leaving ~~17.3~~8.7 acres of undisturbed islands within the disturbed area.

116.200. The initial permit application is for a five year term with anticipated successive five year permit renewals.

116.210 Since the initial permit application is for a term of five years this section does not apply.

116.220 Since the initial permit application is for a term of five years this section does not apply.

117. Insurance, Proof of Publication and Facilities or Structures Used in Common

117.100. The Certificate of Liability Insurance is included as Appendix 8-2.

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chapter 2

TABLE OF CONTENTS

List of Plates

List of Appendixes

stockpile, reseeding if erosion or other elements cause a loss of vegetation, and maintenance of the ditches and/or silt fence in the stockpile areas.

232. Topsoil and Subsoil Removal

232.100 Prior to topsoil removal, eight five gallon buckets of screened 1/4" cryptobiotic soil will be recovered and stored in a cool dry place for redistribution on the topsoil pile. Topsoil material will be removed from those areas of the mine yard where material will be excavated in order to achieve final yard configuration and which have been identified as suitable topsoil for reclamation based on the soil survey. This includes the access road to and around the topsoil pile. This material will be used to construct a berm around the topsoil pile.

The following volumes represent soil resources that may be available for salvage, storage and subsequent redistribution during reclamation. The actual amount salvaged will be reported to DOGM following topsoil removal and stockpiling operations.

AVAILABLE SOIL RESOURCES

Map Unit	Potential Salvage Depth In.	Potential Acres	Potential Estimated Volume YD3	Actual Salvage Depth In.	Actual Salvaged Acres	Actual Salvaged Top Soil YD3
SBG	48	11.83	76343	18	11.~~25~~61	~~2687~~28100
VBJ	30	9.62	38801	18	3.4~~.51~~0	~~9526~~6227
XBS	12	12.09	19505	12	~~4.7873518~~.81	14207
DSH	40	1.56	8389	18	1.~~40329~~16	2809
RBL	8	9.34	10046	8	2.~~59~~17	~~2709~~2340
RBT	6	3.79	3057	6	0.~~77~~56	4~~86~~50
TOTAL[2]		48.23	156141		~~25.30~~27.95	~~5023~~56133
Bank to Loose Cubic Yards *1.18 (Amount topsoil pile is designed to hold.)						~~59278~~66237 (1)

(1) An additional 800 yd^3 will come from the access road around the topsoil pile. This material will be placed in the berm around the topsoil pile.

(2) The 48.23 acres was taken from a soil survey and does not accurately reflect the operators intention to include 42.6 acres of disturbance within the disturbed area boundary.

The actual topsoil salvage will consist of removing a surface layer up to 18 inches thick over the disturbed area. If shale is encountered within 18 inches only the soil above the shale will be salvaged. (Plate 2-3). This would cover about ~~25~~34 acres where soil would be salvaged and stored in the topsoil stockpile.

Total volumes of soil stored in the topsoil pile would be approximately 5~~0~~6,000 bank cubic yards. Removal of stones and boulders would be considered in volume estimates where they are part of the soil layer removed.

The stockpile has been sized to allow for bulking or swell of the soil as it is removed from the bank state to the loose state. A bulking number of 1.18 has been used. The area allowed for topsoil storage is 5~~0~~6,000 bank cubic yards x 1.18 which equals 6~~0~~6,000 loose cubic yards to be placed on the topsoil pile.

Boulders of approximately three feet in diameter and larger will be separated from the topsoil and piled or placed at appropriate locations such as adjacent to roads, pads etc. No attempt will be made to collect the large boulders into common piles. Boulders above ground level are in addition to topsoil volumes and may account for approximately 10,000 cubic yards.

UEI is not stockpiling large stones "boulders". Boulders will be pushed to the side and left during construction and then upon reclamation the boulders will be pushed back into the approximate location form which they came. Rocks of 36" or less will be stored in the topsoil pile with the soil and will be redistributed with the soil.

The approximate 6~~0~~6,000 loose cubic yards of topsoil will be stored in a topsoil pile as shown on Plate 5-2. This topsoil pile will be approximately ~~246'~~350' long and ~~146'~~250' wide with 2:1 slopes. The height of topsoil pile needed is approximately ~~26~~31 feet. The pile as designed has the capability of storing

Lila Canyon
Topsoil
Calculations

Pile Elevation In Feet	Pile Length In Feet	Pile Width In Feet	Volume L X W CYDS	Volume Ends CYDS	Total Volume Cumulative Cubic Yards
	350	250	3240.74		3240.74
1	346	246	3152.44	22.07	6415.26
2	342	242	3065.33	21.78	9502.37
3	338	238	2979.41	21.48	12503.26
4	334	234	2894.67	21.19	15419.11
5	330	230	2811.11	20.89	18251.11
6	326	226	2728.74	20.59	21000.44
7	322	222	2647.56	20.30	23668.30
8	318	218	2567.56	20.00	26255.85
9	314	214	2488.74	19.70	28764.30
10	310	210	2411.11	19.41	31194.81
11	306	206	2334.67	19.11	33548.59
12	302	202	2259.41	18.81	35826.81
13	298	198	2185.33	18.52	38030.67
14	294	194	2112.44	18.22	40161.33
15	290	190	2040.74	17.93	42220.00
16	286	186	1970.22	17.63	44207.85
17	282	182	1900.89	17.33	46126.07
18	278	178	1832.74	17.04	47975.85
19	274	174	1765.78	16.74	49758.37
20	270	170	1700.00	16.44	51474.81
21	266	166	1635.41	16.15	53126.37
22	262	162	1572.00	15.85	54714.22
23	258	158	1509.78	15.56	56239.56
24	254	154	1448.74	15.26	57703.56
25	250	150	1388.89	14.96	59107.41
26	246	146	1330.22	14.67	60452.30
27	242	142	1272.74	14.37	61739.41
28	238	138	1216.44	14.07	62969.93
29	234	134	1161.33	13.78	64145.04
30	230	130	1107.41	13.48	65265.93
31	226	126	1054.67	13.19	66333.78
32	222	122	1003.11	12.89	67349.78
33	218	118	952.74	12.59	68315.11
34	214	114	903.56	12.30	69230.96
35	210	110	855.56	12.00	70098.52

Figure 1

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Chapter 3

into the annual safety training for all employees.

4. Possible restrictions on firearms on the mine site, and restrictions on off road vehicle usage to lesson disturbance.

5. The Operator will ensure that DWR surveys for cliff nesting raptors within proposed facilities areas at least two years prior and one year following construction. The Operator will conduct annual raptor surveys.

   As part of normal mining operation requirements, the Permittee must submit all results of the raptor ~~fly-over~~ surveys to the Division in Annual Reports and must immediately contact the Division, BLM, and USFWS following any raptor survey that shows that eagles are tending nests or nesting. The agencies will immediately coordinate to determine if the Permittee must implement appropriate measures. If the agencies recommend mitigation, the Permittee must submit all plans to the Division for incorporation into Appendix 3 of the MRP.

6. An active golden eagle nest, with young, was documented during the 1999 spring raptor survey. The nest is located in the left fork of Lila Canyon within the 1-mile buffer zone. (See Plate 3-1). A consultation with USF&W, BLM, and UDWR was held in the fall of 1999. Line of site and potential mitigation was addressed during this meeting. The results of this consultation are addressed in Sec 322.220 and the Lila Canyon EA. This nest was not active in 2000, 2001, 2002, or 2003. A survey was not done in 2004. In 2005 nest 946 contained a possibly dead chick. (See Appendix 3-5 for updated inventories)

7. The Operator will adhere to exclusionary periods when initiating construction and final reclamation projects. The exclusionary periods include: raptors (Feb 1 - July 15), Bighorn sheep lambing

(May 1 - June 15), and Pronghorn (May15 - June 20).

In the event of unforeseen changes in construction or mine plans, or in the case of emergency situations that may force the Permittee to conduct activity near or within the 0.5 mile buffer zone of raptor nest and during raptor exclusionary periods (February 1 to July 15 for golden eagles), the Permittee will immediately contact the Division, BLM, DWR, and USFWS. The agencies will immediately coordinate to determine appropriate measures that may include conducting ground surveys, in coordination with DWR, to determine if birds are tending nests or nesting and possibly determine the life stage of the offspring; developing a mitigation plan, in coordination with the agencies, for possible impacts to nests or birds; or ceasing operations until the end of breeding season to avoid 'take'. If the agencies recommend surveys, the Permittee must submit all survey results to the Division in Annual Reports. If the agencies recommend mitigation, the Permittee must submit all mitigation plans to the Division for incorporation into Appendix 3 of the MRP.

The Applicant does not plan to monitor any wildlife species during the life of the operation with the exception of raptors. ~~Helicopter s~~Spring raptor surveys will be conducted at a minimum of a 1-mile radius around any new or potentially disruptive mining activity, 2-years prior and annually after the proposed activity. The Operator will contact the USFWS and the Division immediately following raptor ~~fly-over~~ surveys if raptors are observed tending nests or nesting.

The mine will emphasize their commitment to legal requirements of firearm and off-road vehicle-use by employees. This type of program has been adopted by the operator and will continue throughout the operation. An education program aimed at minimizing potential negative impacts by employees will be presented

Prior to any new surface disturbance a raptor inventory will be conducted to ensure that no raptors or their nests or young would be adversely impacted through any mining or mine related activity. A copy of historical raptor data as well as current survey results are attached as Appendix 3-5.

A one-half mile buffer zone of no new disturbance during critical nesting periods will be maintained during that portion of the year that the nest sites are active.

As part of normal mining operation requirements, the Permittee must submit all results of the raptor ~~fly-over~~ surveys to the Division in Annual Reports and must immediately contact the Division, BLM, and USFWS following any raptor survey that shows that eagles are tending nests or nesting. The agencies will immediately coordinate to determine if the Permittee must implement appropriate measures. If the agencies recommend mitigation, the Permittee must submit all plans to the Division for incorporation into Appendix 3 of the MRP.

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chapter 4

42.6 acres discussed is Section 116.100, Section 542.200, Appendix 5-8. Includes areas of undisturbed within the disturbed area.

Top Soil removal / Actual Disturbance:

~~25~~33.~~3~~86 Acres discussed in Section 232.100" This is the actual area anticipated to be disturbed for the life of the mine.

The permit area for the Lila Canyon mine is depicted on Plate 4-1. Included in this map are: the boundary of the permit area, the area which will include surface facilities, and the new portals. Existing roads, power lines, and railroads are identified. Private, federal, and state ownership are also identified on this plate. Wildlife habitats have been identified on Plate 3-1 and grazing allotment boundaries are depicted on Plate 4-2.

Table 4-1 lists the various owners of land within and around the permit area. The permit area is approximately 5992.07 acres. Within the permit area, 1446.64 acres comprise private land and 289.06 acres comprise state lands. The remaining 4,256.37 acres is federal land owned and managed by the United States Bureau of Land Management (BLM). Table 4-2 describes the surface ownership and Table 4-2A describes the coal ownership of the permit and surrounding area.

Lila Canyon lies within a region identified by the BLM as the Range Valley Mountain Habitat Management Plan Area (U-6-WHA-T4). This region was designated as such by a technical committee comprising state, federal, local government agencies and private citizens. This Habitat Management Plan area was established in September 1991 to provide management for the wildlife species of the area, including federally protected wildlife and plant species, big game, upland and small game waterfowl, unique and limited high value wildlife habitat, and access management. Big game and raptor habitat within the Lila Canyon Mine permit area, along with the Range Valley Mountain HMA, have been identified on Plate 3-1.

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chapter 5

Red LINE

14) 48-inch Conveyor from Crusher to Loadout Bin
15) ~~48-inch Conveyor~~Drop from Loadout Bin to Truck Loadout
16) Reclaim Tunnel, Escape Tunnel, Fan and Fan House
17) ROM Storage Pile, Coal Stacking Tube
18) Crusher Screen Plant
19) Truck Scale and Loadout
20) Coal Loadout Storage Bin
21) Guardrails
22) Underground Pipes
23) Chain Link Fence

Support Facilities

24) Non-Coal Waste Area
25) Equipment & Supplies Storage Area
26) Topsoil Pile
27) Refuse Pile
28) Sediment Pond
29) Slope Access Road / Portal Access Road
30) Rock Slopes
31) Mine Facilities Road / Truck Loadout Road
32) Office/Bathhouse/Warehouse Asphalt Parking Area
33) Mine Parking
34) Fuel Tanks
35) Powder and Cap Magazines
36) Culvert locations are shown on Plate 7-2.
~~37) Coal pile Road (Slope between the coal pile road and the portal access road will be evaluated after road construction and be labeled either disturbed or undisturbed, as appropriate, on an As-Built site map.~~

A description of new structures and facilities ~~follows~~:

~~Office/Bathhouse~~ Office/Bathouse

The office and bathhouse building is shown on Plate 5-2. This building will jointly house all support personnel such as accounting, administration, engineering, and safety and will provide a comfortable office environment for all employees. Bathhouse and toilet facilities will be found for all employees at this location. The bathhouse will proved for a location for underground miners to change from clean street clothes to clothing suitable for underground use. The area will proved showers for employees for use after their scheduled work shifts so they can cleanup prior to returning home.

Both the bathhouse and office buildings will be of prefab construction and will rest on a concrete pad. The pad dimensions will be approximately 150' by 100' by 12". The facility will be designed to accommodate up to ~~145~~200 employees working rotating shifts.

Shop Warehouse

The shop warehouse building is shown on plate 5-2. Parts and supplies consumed during the mining process will be stored in the warehouse to be issued as needed. The shop area will be used to perform minor equipment repairs and overhauls. The shop warehouse will be a prefab modular type building approximately 100' by 150' and will rest on a 4" concrete pad.

Security Shack

The Security Shack shown of Plate 5-2, when used will provide security to the mine site. The security shack will be used primarily at times when the mine is not in production. Security may be provided to protect the public from hazards associated with a mine site and to protect company property from unauthorized use. The security shack will be approximately 10' by 20' by 8`` and will be of prefab construction and will rest on a 4" concrete slab.

Mine Substation

The mine substation will be located as shown on Plate 5-2 will proved power to surface and underground areas of the mine property. The substation will comprise of approximately four transformers setting on a concrete pad approximately 20' by 20' by 12" and fully fenced. The total area of the substation is approximately 40' by 40'. Power will be fed into the transformers at 46 KVA and will be transformed down to usage voltages for both the surface and underground facilities. It is anticipated that voltages of 110, 220, 440 will be used on the surface and 12,470 volts will be utilized underground. The mine substation will be constructed in a way to fulfill all appropriate MSHA regulations.

Underground Power Lines

Within the disturbed area it is anticipated all power lines will be underground. Underground lines will be run where feasible. As builds will be provided. Underground Power Lines will be left in place upon reclamation.

Water Treatment Plant

The water treatment plant is located on the north-east side of the surface facility area. The plant will rest on a 15' by 15' slab. Process water will flow through the treatment plant at which time it will be treated and made suitable for potable water uses. The potable water will be stored in the potable water tank until it is used. The location of the water treatment plant can be found on Plate 5-2.

Potable Water Tank

Water treated by the water treatment plant and intended to be used as potable water will be stored in this 15' diameter by 20' high tank. The tank will set on a 15' by 15' concrete pad designed for adequate support of the tank. The location of the potable water tank can be found on Plate 5-2.

Process Water Tank

Process water, water to be used for mine use or to be treated for potable use, will be stored in this tank. The 15' diameter by 20' high process water tank will rest on a 15' by 15' concrete pad. Process water tank will be filled by using mine discharge water or may be hauled in from off site. The location of the process water tank can be found on Plate 5-2.

Sewer Tank

The sewer tank has been designed to facilitate ~~145~~200 employees working on rotating shifts. The sewer tank will be located under the south end of the office and bathhouse parking area. The location of the sewer tank can be found on Plate 5-2. The design for the Sewer Tank can be found in Appendix 5-4.

Drain Field

The drain field has been designed to facilitate ~~145~~200 employees working on rotating shifts The drain field will be located at a lower elevation and south of the sewer tank. The location of the drain field can be found on Plate 5-2. The design for the drain field can be found in Appendix 5-4.

Ventilation Fan

The ventilation fan will be accessed and installed from underground. The ventilation portal will be driven from underground and broken from inside out. The location of the portal and fan is shown on Plate 5-2. Fan power will

be run underground. Fan access for maintenance and monitoring will be from the underground works. The need for surface fan access is not anticipated at this time, access will be from underground.

60-inch Conveyor from tunnels to Coal Stockpile(Main Conveyor)

The Run of Mine underground belt will provide for a means for coal to be conveyed from the working faces to the run of mine coal storage pile on the surface. The belt will provide capacity to convey to the surface, all coal mined in the underground workings. Preliminary design suggests that the conveyor that extends from the bottom of the rock slopes to the stacking tube at the coal storage area, shown on Plates 5-2 and 5-8, will have the following specifications: 60" wide, speed approximately 700 fpm with a length of approximately ~~320~~810 feet long. Since the ground beneath the conveyor will not be disturbed due to the steepness and remoteness of the area, this conveyor will be completely contained within a tube type structure.

(ROM) Underground Belt from Stockpile to ~~Crusher~~Crusher/ Screen

The Reclaim conveyor will provide for a means for coal to be conveyed from the coal stockpile to the crusher. The belt will provide capacity to convey to the screen and crusher at a ~~rate~~ suitable rate for crushing and screening. Preliminary design suggests that the reclaim conveyor, shown on Plates 5-2 and 5-8, will have the following specifications: ~~48~~60" wide, speed approximately ~~500~~700 fpm with a length of approximately ~~280~~670 feet long. The portions of the conveyor running on the surface will be covered.

~~48~~60-inch Conveyor from Crusher to Loadout Bin

The Loadout conveyor will provide for a means for coal to be conveyed from the crusher to the loadout bin. The belt will provide capacity to convey to the loadout at the same rate as the Reclaim conveyor. Preliminary design suggests that the Loadout conveyor, shown on Plates 5-2 and 5-8, will have the following specifications: ~~48~~60" wide, speed approximately 500 fpm with a length of approximately 2~~1~~30 feet long. The portions of the conveyor running on the surface will be covered.

~~48-inch Conveyor~~Drop from Loadout Bin to Truck Loadout

~~The Truck conveyor~~Coal will ~~provide for a means for coal to~~ be ~~conveyed~~dropped from the loadout bin to the trucks being loaded. The ~~belt~~drop rate will provide capacity ~~to convey~~ to the trucks at a rate suitable for truck loading. ~~Preliminary design suggests that the truck conveyor, shown on Plates 5-2 and 5-8, will have the following specifications: 48" wide, speed will vary with a length of approximately 50 feet long. The portions of the conveyor running on the surface will be covered.~~

Reclaim Tunnel, Escape Tunnel, Fans

Design for the escape and reclaim tunnels is not complete. Standard practice is to construct the tunnels from either concrete or corrugated metal. The reclaim tunnel is approximately ~~275'~~350' long with a 14' diameter. The escape tunnel will be approximately ~~100'~~300' long with a diameter of 4'. Appropriate safety and environmental concerns will be addressed upon detailed design. The preliminary layout is shown on Plates 5-2 and 5-8.

ROM Storage Pile

The run of mine storage pile receives coal directly from the underground works and provides storage for the coal until it is crushed and loaded into trucks for transportation to a unit train loadout. The coal from the underground run of mine belt will be dropped into a stacking tube located in the center of the run of mine storage pile. This tube will help reduce any fugitive dust. The stacking tube will be approximately 80' high and will allow for approximately 2~~7~~00,000 tons of open storage in the run of mine storage pile. The run of mine storage pile is shown on Plates 5-2 and 5-8.

Crusher

The enclosed crusher will crush coal from the 8" minus down to a 2" minus size, at the rate of approximately ~~500~~1000 tons per hour. ~~No screening is anticipated at this time~~The coal will be first screened then the oversized will be crushed. ~~The c~~Crushed coal will ~~leave the crusher and~~ be stored temporarily in a 500 ton storage bin located ~~at~~above the truck loadout. The crusher and screen location ~~is~~s are shown in Plates 5-2 and 5-8.

Truck Scale and Loadout

Coal will be reclaimed from the coal storage bin, weighed and then loaded into coal haul trucks for transportation to the various unit train loadouts. A small loadout shack will be constructed to provide cover and protection for the various equipment and controls need for the coal loading process. The truck scale and loadout are shown on Plates 5-2 and 5-8.

DC-10	55'	18"
DC-11	65'	18"
DC-12	50'	18"
DC-13	30'	24"
DC-14	60'	18"
DC-15	60'	18"
DC-16	60'	18"
DC-17	75'	18"
DC-18	35'	18"
DC-19	40'	18"
UC-1	480'	60"

Guard Rails

Approximately 1,520 feet of Guard rails will be installed on the mine access road according to the detailed engineering plan being prepared. Appropriate MSHA and UDOT requirements will be taken into consideration.

Underground Pipes

Locations of the underground pipes have yet to be determined. Once detailed engineering design is completed the underground pipes will be added to Plate 5-2 or other appropriate Plates. Under ground pipes will be left in place upon reclamation.

Chain Link Fence

Approximately 1,500' of a six foot high chain link fence will be constructed as shown on Plate 5-2. The fence will be constructed to protect the public, and proved security along the section of county road that runs adjacent to the property.

Non-Coal Waste Area

An area for non-coal waste has been identified on Plate 5-2. Non-coal waste such as papers, timbers, cans, and miscellaneous scrap that is brought to the surface will be disposed of in a metal bin or "dumpster" located in the non-coal waste area identified on Plate 5-2. Metal will be separated from other forms of trash for salvage. Material not salvageable will be transported to the East Carbon Development Corporation (ECDC)

dump or other approved disposal site for permanent disposal. Once a dumpster has reached capacity, the full dumpster will be replaced with an empty dumpster, and then the full dumpster will be hauled by a contract hauler to the specified disposal site.

Equipment & Supplies Storage Area

The equipment and supply storage area is approximately 350' by 400'. This storage area will be used to store mine supplies and equipment from the time of delivery until they are needed underground. Supplies such as timbers, bolts, plates, rock-dust, pipes, resin, screens, concrete blocks, steel, cables, and numerous other materials may be stored in this area. Equipment both new and used will be stored in this area. Many various longwall pieces such as shields, pan-lines, shears, chains, head and or tail drives, transformers, belt drives, pumps and numerous other material will be stored in this storage area. This secure area provides for a good storage area for diesel, gasoline, hydraulic, and roadway chemicals. All oil tanks will have appropriately designed berms or retaining walls. The equipment and supplies storage area is shown on Plate 5-2. Any explosives will be stored here according to appropriate MSHA regulations. Rock dust bins will be located in this area.

Topsoil Pile

The topsoil pile has been located on the south west end of the surface facilities. The pile has been designed to contain adequate topsoil for redistribution according to the reclamation plan found in Chapter 5. The proposed location provides for good protection from wind contamination as well as protection from mine related activities. The location of the topsoil pile is shown on Plate 5-2.

Refuse Pile

~~The~~A temporary refuse pile has been designed to provide a location for the storage of underground development waste that is brought to the surface ~~and for any excess slope rock which will be generated and not used as fill. The capacity of the pile is designed for approximately 44,400 yd3 which is in excess of projected needs. The refuse pile design is shown in Appendix 5-7 and shown on Plate 5-2. The areas for the rock slope material and for~~. Any underground development waste ~~are adjacent and conjoining~~

~~and will be treated as one area or structure~~, other than rock slope material, will be placed in the temporary refuse pile then transported to an approved disposal site. The rock slope material will be used as fill as per Appendix 5-7. The capacity of the temporary pile will only be a few hundred tons. The area for the rock slope material is shown on Plate 5-2.

Sediment Pond

The sediment pond has been design to provide for adequate sediment protection for the project area. All water running off the disturbed area will be routed into the sediment pond for treatment. The sediment pond has been designed according to the appropriate R645 regulations and the designs can be found in Appendix 7-4 and Plate 7-6. Because the sediment pond does not fit into the requirement of 30 CFR 77.216(a) an MSHA number for the proposed pond is not required. The sediment pond is located on the south-west end of the property and shown on Plate 5-2.

Slope Access / Portal Access Road

The slope access road splits off the facility access road near the north-east corner of the equipment and supply storage area, and follows an alignment that takes into consideration grade and direct access. The slope access road will be used to provide access to the rock slopes which in-turn proved access to the underground workings. The slope access road will be used as access for all men, material and equipment need in the mine. Since the slope access road provides for frequent access for men, equipment and materials for a period of six months or longer the slope access road is classified as a primary road and will be paved. The slope access road will be designed, constructed, and maintained according to appropriate R645 regulations. The slope access road is shown on Plate 5-2.

Rock Slopes

Access to the underground workings of the Lila Canyon Mine will be provide by two rock slopes driven from the top of the Mancos shale up-dip to the intersection of the coal seam. One portal will proved for access for men, equipment and material to the mine. The second access slope will contain the run of mine belt line from the underground workings of the mine to the run of mine stock pile. There is a possibility that only one larger slope will be driven and then divided. to provide for two separate entries. The two 1,227 foot long slopes will slope up at approximately 12%, from a starting elevation

of approximately 6150'. The intersection of the coal seam and the rock slope will take place at approximately 6,300 feet elevation. The length of the slopes were minimized by taking advantage of the coal seam dip which is approximately 12% to the east. The rock material removed from the slopes will be used as fill material for the surface facilities. The rock slope material / underground development waste will contain mostly shale, sandstone and mudstone. Traces of coal may be found but the amount will be insignificant. There are no known coal seams or significant rider seams found below the Sunnyside Seam in the Lila Canyon Portal Area. The rock slope locations are shown on Plate 5-2.

Mine Facilities Road / Truck Loadout Road

The mine facility road shown on Plate 5-2 begins at the edge of County Road 164 and allows for access to the various surface facilities. The road has been located in the most practical location taking into consideration grade, stability, and alignment. Employees will use this road to access the office & bathhouse facilities. Coal haul trucks will use this road to access the scales and truck loadout. All supplies will be hauled on a short portion of this road from the supply storage area to the slope access road. The road will be paved during construction of the facilities and before coal ming operations begin in order to to minimize dust and provide good surface for heavy truck traffic as well as facility access. The facility access road will be approximately 24' wide to provide for two lane traffic and will have the appropriate drainage controls to insure long term life and low maintenance. The has been constructed and will be maintained according to the appropriate R645-534 and R645-527 regulations.

~~**Coal Pile Road**~~

~~The Coal Pile Road is shown on plate 5-2. The Coal Pile Road will be 15' wide and will follow the existing contours approximately 400' from the Portal Access Road to the ROM coal pile. A typical cross section similar to the ancillary road can be found in Appendix 5-4 (Figure 1).~~

~~Office/Bathhouse/Warehouse~~Office/Bathhouse/Visitor Parking Area

Parking will be as shown on Plate 5-2. Parking facilities for office,

mine, and warehouse employees will be provided jointly as shown. This area will also provide parking for all vendors, and visitors. The surface of the ~~150'~~220' by ~~475'~~350' area will ~~initially be graded and graveled but may eventually~~ be paved. The parking area is located and designed to allow for convenient and safe parking of personal vehicles. The sewer tank and drain field will be located on the ~~south~~north end of this parking area.

Mine Parking

A mine parking area will be provided as shown on Plate 5-2. The mine parking area is where all mine and mine related mobile equipment will be parked when on the surface. This is the location where the underground work crews will be loaded into man trips for transportation to the various work areas. The mine parking area will ~~initially be graded and graveled but~~

~~eventually may~~ be paved. The mine parking area will be approximately ~~100~~70' by 2~~0~~20'.

Fuel Tanks

Fuel tanks will be located in the Equipment & Supplies Storage Area and be installed as discussed under Equipment & Supplies Storage Area. A 1,500 gallon diesel tank, 500 gallon hydraulic tank and a 500 gallon gasoline tank will be needed.

Powder and Cap Magazines

Powder and cap magazines will be mobile temporary, and supplied by the explosive distributer. Upon reclamation the powder and cap magazines will be returned to the distributer.

As per the approved Air Quality Order ~~haul~~all roads will be paved and ~~unpaved roads and~~the pad areas used by mobile equipment will be treated with water or dust suppressant, open stockpiles will be watered as conditions warrant.

521. Included in this section are maps, cross sections, narratives, descriptions and calculations used to satisfy the relevant requirements. This section describes and identifies the lands subject to coal mining and reclamation operations covering the estimated life of the project.

521.100 This application includes the cross sections, maps and plans needed to present the relevant information required by the Division. This information includes the following:

521.110. Plate 5-1 Shows area previously mined and approximate dates of mining.

521.111 Plate 5-1 of part 'B" and 2-2 of part "A" shows the location and extent of known workings of inactive, or abandoned underground mines. The surface portals or mine openings to the surface are shown. Plates 5-1 and 2-2 of part "A" have been prepared and certified by or under the direction of a registered professional engineer.

Doelling lists several coal mines and mining

~~eventually may~~ be paved. The mine parking area will be approximately ~~100~~70' by 2~~0~~20'.

Fuel Tanks

Fuel tanks will be located in the Equipment & Supplies Storage Area and be installed as discussed under Equipment & Supplies Storage Area. A 1,500 gallon diesel tank, 500 gallon hydraulic tank and a 500 gallon gasoline tank will be needed.

Powder and Cap Magazines

Powder and cap magazines will be mobile temporary, and supplied by the explosive distributer. Upon reclamation the powder and cap magazines will be returned to the distributer.

As per the approved Air Quality Order ~~haul~~all roads will be paved and ~~unpaved roads and~~the pad areas used by mobile equipment will be treated with water or dust suppressant, open stockpiles will be watered as conditions warrant.

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Doelling lists several coal mines and mining

physically segregated and stockpiled.

522. Coal Recovery

Additional Details can be found in the R2P2 on file at the BLM Office.

Effective barrier and pillar designs are essential for safe and productive underground mining. Barrier pillars will be sized according to accepted engineering practices. One or more of the following methods may be used to properly size barrier pillars: Dunn's Rule, the Old English Barrier Pillar Law, Pennsylvania Mine Inspector's Formula, Ash and Eaton Impoundment Formula, Pressure Arch Method, British Coal Rule of Thumb, North American Method, Holland Rule of Thumb, or Holland Convergent Method.

Regardless of the methods or care taken to properly size barrier pillars the true effectiveness on any design can only be determined by conducting full-scale in-mine performance evaluations. Mine experience and history in the local area will have as much influence on pillar sizes as does the engineering formulas.

Barrier pillars will be utilized to isolate the abandoned Horse Canyon Mine from the new Lila Canyon Mine. Barrier pillars will also be used to simplify ventilation, to provide independent escape routes and to possibly retain large quantities of mine water. Barrier pillars will be employed along the outcrop in order to maintain ventilation courses.

A barrier pillar where no second mining will be allowed within the barrier will be used to protect the escarpments. The width of the escarpment barrier will be determined by implementing a 21.5° angle of draw project downward from the surface to the coal seam. Development mining or first mining will be allowed within the escarpment barrier.

For longwall mining applications the abutment loading is of prime importance. Initial longwall pillars will be designed using the ALPS method. Again mine experience and history in the local area will have as much influence on pillar sizes as does the engineering formulas.

Mine pillars will be sized taking into consideration the coal strength, depth of cover, width and height of pillars using one or more of the following methodologies: Obert-Duvall, Holand-Graddy, Holland, Salamon-Munro, or Bieniawski. Again mine experience and history in the local area will have as much influence on pillar sizes as does the engineering formulas.

526.100 Mine Structures and Facilities.

526.110 The only existing structures are found in Horse Canyon (Part "A" of this permit) and are the remains of the United States Steel operation. Horse Canyon has received phase II bond release and the remaining structures have been left in place for future use. Only three existing structures, a 60" and a 48" CMP culverts located near the new proposed surface facilities, and the County road on top of Little Park, can be found within the Lila Canyon Permit. The existing culvert is shown on plate 5-1A. The existing road on Little Park can be found on Plate 5-1 as well as most other plates showing the surface area of the Lila Canyon Permit. Several vehicle ways will be used for water and subsidence monitoring. These ways branch off the Little Park Road and generally follow the ephemeral drainages. The ways are shown on Plate 5-1 as well as most other plates showing the surface area of the Lila Canyon Permit. More detail of the existing Little Park Road can be found in ~~App.~~Appendix 5-4.

526.111 The location of the existing culverts is shown on Plate 5-1A.

526.112 Most of the existing 48" culvert is outside the permit boundary and is the Counties responsibility. UEI will grade the site so that during reclamation and operations surface flows will be directed away from the 48" culvert. The 60" culvert is in poor condition and will be replaced by the county. UEI will add on to the culvert during the operation and reclamation phase. The bottom 30' is the responsibility of the County, the upper portion is the responsibility of UEI.

526.113 It is believed that the existing culverts were installed with the road construction around 1940.

526.114 Since the existing culvert is going to be removed upon construction of the sediment pond this section does not apply.

526.115 Since the existing culvert is going to be removed

a six foot chain link fence to be constructed adjacent to the Lila Canyon Road to provide safety to the general public in the proximity to the mine site and mine related structures and activities.

526.116.2. At the current time there are no plans to relocate any public road.

526.200 Utility Installation and Support Facilities.

526.210 All coal mining and reclamation operations will be conducted in a manner which minimizes damage, destruction, or disruption of services provided by oil, gas, and water wells, oil, gas, and coal-slurry pipelines, railroads, electric and telephone lines, and water and sewage lines which may pass over, under, or through the permit area, unless otherwise approved by the owner of those facilities and the Division. Since no existing services are found within the projected disturbed area, no negative impact to any service is anticipated.

~~This area Intentionally left Blank.~~

526.220 The new support facilities are described in section 520 and in Appendix 5-4 and shown on plate 5-2 and will be operated in accordance with the mine reclamation plan. Plans and drawings for each support facility to be constructed, used or maintained within the permit area are found in Appendix 5-4, Plates 5-7A, 5-7B, and 5-8.

526.221 The new facilities designs shown in Appendix 5-4 prevents or controls erosion and siltation, water pollution, and damage to public or private property, and:

526.222 The new facilities designs shown in Appendix 5-4 minimizes damage to fish, wildlife, and related environmental values; and minimizes additional

contributions of suspended solids to stream flow or runoff outside the permit area to the extent possible by using the best technology currently available.

Islands of undisturbed areas within the permit area will be visually monitored for coal fines deposition. If monitoring reveals coal fine deposition, then water sprays on the area from which the fines are originating will be warranted as per August 27, 1999 Approval Order.

526.300 Water pollution control facilities consist of sedimentation control and properly designed sewage systems.

The sedimentation control is accomplished by containing all disturbed area runoff in a properly sized sedimentation pond. Complete designs are presented in Appendix 7-4 and on Plate 7-6.

The sewage system will consist of a septic tank and drainfield. The system is shown on Plate 5-2. Complete designs are presented in Appendix 5-4.

The drain field design and layout is shown on plate 5-2~~b~~ and details are shown in Appendix 5-4.

526.400 Since Lila Canyon Mine is an underground operation this section does not apply.

527. Transportation Facilities.

527.100 All new roads within the disturbed area have been classified as primary ~~except for the coal pile road which is used infrequently~~.

527.110 See Sections 527.120 and 527.130.

527.120 The Slope Access Road / Portal Access Road and the Mine Facilities Road / Truck Loadout Road will be used frequently for access for a period in excess of six months, and or will transport coal, they are classified as primary roads.

527.121 See 527.120 above.

527.122 See 527.120 above.

527.123 Since none of the new roads planned within the disturbed area will be retained for an approved postmining land use this section does not apply.

527.130 ~~The Coal Pile Road is used infrequency and will be classified as~~There are no ancillary roads within the disturbed area. .

527.200 A detailed design and description for each road, and conveyor to be constructed used, and maintained within the proposed permit area is included in Appendix 5-4. The roads are show on Plate 5-2.

527.210 The specifications for each road width, road gradient, road surface, road cut, fills, embankments culverts, drainage ditches and drainage structures are shown on Plate 5-2 and in Appendixes 5-4 and 7-4.

527.220 Since no alteration or relocation of natural drainage ways is anticipated this section is not applicable.

527.230 Roads shall be maintained in manner that allows them to meet their design standards throughout their use.

527.240 If any of the roads on the disturbed area is damaged by a catastrophic event, the road will be repaired as soon as practical after the damage has occurred.

527.250 Steep cut slopes or requests for alternative specifications are not anticipated at this time therefore this section does not apply.

528. Handling and Disposal of Coal, Overburden, etc:

A narrative explaining the construction modifications, use, maintenance and removal of coal, overburden, excess spoil and coal mine waste.

528.100 Coal will be mined using continuous miners and longwall equipment. The coal will be transported from the face and deposited on the underground mine belts using shuttle cars or continuous haulage equipment. The coal will be transported by a series of conveyor belts from the section to the run of mine

stockpile. The coal will be removed from the run of mine stockpile by a reclaim belt to an enclosed ~~crusher~~crusher/screen. Once crushed the coal will be conveyed to a storage bin from which it will loaded in to coal haul trucks for transportation to a unit train loadout.

528.200 Overburden: Lila Canyon is an underground operation and it is not anticipated that any material that overlays the coal seam, consolidated, or unconsolidated, other than topsoil, will be disturbed. Therefore, this section does not apply.

528.300 Spoil, coal processing waste, mine development waste, and noncoal waste removal, handling, storage, transportation, and disposal areas and structures are discussed below.

528.310 Excess Spoil: Since Lila Canyon is an underground operation it is not anticipated than any spoil will be generated. Therefore this section does not apply.

528.320 Coal Mine Waste: Coal processing waste and underground development waste brought to the surface, will be placed in disposal areas within the permit area which are approved by the Division for this purpose. Rock removed from the access slopes will be placed in the ~~refuse pile~~rock slope material disposal area. Portions of this material, not containing coal, will be used as structural fill for the shop/warehouse. ~~The areas for the rock slope material and for underground development waste are adjacent and conjoining and will be treated as one area or structure. The refuse pile is~~The temporary refuse pile and slope rock disposal area are shown on Plate 5-2 and in Appendix 5-7.

528.321 Coal processing waste produced from the crusher will not be returned to any abandoned underground workings. Any and all of the coal processing waste from the crusher will be deposited in the temporary refuse pile shown on plate 5-2 and in Appendix 5-7 and then transported to UEI's Wildcat loadout for permanent disposal.

528.322 Refuse Piles. Each pile will meet the requirements of MSHA, 30 CFR 77.214 and 30 CFR 77.215,

meet the design criteria of R645-301-210, R645-301-512.230, R645-301-513.400, R645-301-514.200, R645-301-515.200, R645-301-528.320, R645-301-536 through R645-301-536.200, R645-301-536.500, R645-301-536.900, R645-301-542.730, R645-301-553.250, R645-301-746.100, R645-301-746.200, and any other applicable requirements.

528.323 Burning and Burned Waste Utilization.

528.323.1. Coal mine waste fires will be extinguished by the person who conducts coal mining and reclamation operations, in accordance with a plan approved by the Division and MSHA. The plan will contain, at a minimum, provisions to ensure that only those persons authorized by the operator, and who have an understanding of the procedures to be used, will be involved in the extinguishing operations. The coal mine waste fire plan can be found in Appendix 5-3. MSHA approval is not required unless you have an actively burning fire. (Phone conversation with Billy Owens MSHA Denver 5/31/05)

528.323.2. No burning or burned coal mine waste will be removed from the permitted disposal area.

528.330 Noncoal Mine Waste.

528.331 Noncoal mine wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining activities will be placed and stored in a controlled manner in a designated portion of the permit area. The noncoal mine waste will be placed in dumpsters and emptied on a as needed basis. The designated noncoal waste area is shown on Plate 5-2.

R645-301-358, R645-301-527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-542.600, R645-301-542.600, and R645-301-762, any necessary design criteria established by the Division, and the following requirements. Primary roads will:

534.310 The roads will be located insofar as practical, on the most stable available surfaces.

534.320 The roads will be surfaced with rock, crushed gravel, asphalt, or other material approved by the Division as being sufficiently durable for the anticipated volume of traffic and the weight and speed of vehicles using the road;

534.330 The roads will be routinely maintained to include repairs to the road surface, blading, filling potholes and adding replacement gravel or asphalt. It will also include revegtating, brush removal, and minor reconstruction of road segments as necessary.

534.340 Culverts if required will be designed, installed, and maintained to sustain the vertical soil pressure, the passive resistance of the foundation, and the weight of vehicles using the road.

535. Spoil: It is anticipated that no spoil will be produced at the Lila Canyon Mine therefore this section is not applicable.

536. Coal Mine Waste: The proposed Lila Canyon Mine will produce 2 separate types of coal mine waste:

1. Normal coal processing waste or refuse and;
2. Underground development waste~~.~~

~~Disposal of each of the 2 types of coal mine waste will be the same and both type will be deposited in the refuse storage area shown on plate 5-2.~~

(rock slope material).

The rock slope material / underground development waste will be examined and tested as necessary to determine acid- or

toxic-forming potential.

Coal Processing waste and any underground development waste containing too much coal to leave underground, will be disposed of in the refuse storage area as described further in this chapter and in Appendix 5-7.

It is not anticipated that any underground waste other than the rock slope material / underground development waste will be brought to the surface. Coal processing waste and underground development waste brought to the surface will be placed in a controlled manner and have a design certifications describe under R645-301-512 if appropriate.

536.100 The refuse pile at Wildcat has been designed using current prudent engineering practices and will meet design criteria established by the Division. ~~See Appendix 5-7.~~

536.110 The refuse pile will be designed to attain a minimum long-term slope stability safety factor of 1.5. See Appendix 5-7.

536.120 The refuse pile will be constructed on natural ground once the topsoil has been removed according to section 230.232. There are no underground mine workings in the immediate area of the refuse pile. All mine workings are found at a higher elevation than the refuse pile.

536.200 Underground development waste brought to the surface and coal processing waste deposited in the refuse pile will be deposited according to the plan described in Appendix 5-7.

536.210 Refuse Pile construction described in Appendix 5-7, will ensure mass stability and prevent mass movement during and after construction;

536.220 Refuse Pile construction per the plan in Appendix 5-7 will not create a public hazard; and

536.230 Will prevent combustion.

536.300 Since no spoil fills will be generated this section does not apply.

536.400 Since there will not be any impounding structures constructed of coal mine waste this section does not apply.

536.500 As discussed in Section 536 and 536.300, it is proposed to dispose of the rock slope material / underground development waste within the ~~refuse~~rock disposal area and be used as structural fill as shown on Plate 5-2.

536.510 It is not anticipated that coal mine waste ~~will~~materials from activities located outside the permit area be disposed of in ~~any area off t~~he permit area. ~~-~~ Therefore this section does not apply.

536.520 It is not anticipated that coal mine waste will be ~~disposed of in any area off the permit area. Therefore~~brought to the surface then taken back underground for disposal therefore this section does not apply.

536.600 In areas where slope rock or coal processing waste is deposited, the topsoil will be removed and stored in the topsoil stockpile area until reclamation.

536.700 It is not anticipated that coal processing waste will be returned to abandoned underground workings therefore this section does not apply

536.800 Since no coal processing waste banks, dams, or embankments are planned for the Lila Canyon Mine therefore, this section does not apply.

536.900 Refuse Piles. (See Appendix 5-7) The refuse pile is designed to meet the requirements of R645-301-210, R645-301-512.230, R645-301-513.400, R645-301-514.200, R645-301-515.200, R645-301-528.322, R645-301-528.320, R645-301-536 through R645-301-536.200, R645-301-536.500, R645-301-536.900, R645-301-542.730, R645-301-553.250, R645-301-746.100 through R645-301-746.200, and the requirements of MSHA, 30 CFR 77.214 and 30 CFR 77.215.

537. Regraded Slopes.

537.100 Each application will contain a report of appropriate geotechnical analysis, where approval of the Division is required for

alternative specifications or for steep cut slopes under R645-301-358, R645-301-512.250, R645-301-527.100, R645-301-527.230, R645-301-534.100, R645-301-534.200, R645-301-534.300, R645-301-542.600, R645-301-742.410, R645-301-742.420, R645-301-752.200, and R645-301-762.

540. Reclamation Plan. (See Appendix 5-8 for reclamation plan.)

541. General.

541.100. The operator is committed to performing all reclamation as in accordance with R645 rules.

541.200. N/A. The operator is not involved in surface mining activities.

541.300. The operator is committed to the removal of all equipment facilities and structures upon cessation of mining activities.

541.400. The operator will address all reclamation activities as referenced in Chapter 5 of this document.

542 Narratives, Maps and Plans.

542.100. See Table 3-3 time table based on project reserves markets and life of mine.

542.200. The perimeter of the disturbed area contains approximately 42.6 surface acres within the disturbed area but only ~~25~~33.~~3~~86 acres will be disturbed leaving ~~17.3~~8.74 acres of undisturbed islands within the disturbed area.

The following R645 regulations will give detailed description and reclamation procedures to address these areas of disturbance. The reclamation plan for the sediment pond and drainage control structures can be found in Appendix 7-4.

Topsoil amounts can be found in Section 232.100 and

542.700. Final Abandonment of Mine Openings and Disposal Areas.

542.710. Appendix 5-6 depicts a typical seal that will be constructed at all mine openings.

542.720. No excess spoil is anticipated at this time.

542.730. All coal mine waste will be placed in the waste disposal area as shown on Plate 5-2 or sent to the Wildcat loadout, and reclaimed in accordance with R645 regulations.

542.740. Disposal of Noncoal Mine Wastes.

542.741. All non coal waste will be temporarily stored on site in approved waste bins and commercially picked up and transported to an approved disposal site. Non Coal waste generated during reclamation (such as concrete structure, buried culverts, utility lines, septic systems etc.) will be buried in the refuse disposal area and covered with a minimum of four feet of fill.

542.742. No noncoal waste will be stored on site or disposed of on site during the life of the mine.

542.800. A detailed cost break down is included in Chapter 8. Appendix 8-1 relative to bonding.

550 Reclamation Design Criteria and Plans. Each permit application will include site specific plans that incorporate the following design criteria for reclamation activities.

551. All underground openings will be sealed as detailed in Appendix 5-6.

552. Permanent Features.

552.100. In course of reclamation, areas that have been

553.140 Erosion and water pollution will be minimized on site by the use of drainage control structures (burms, channels and silt fence) and the use of small depression, soil tackifiers, mulch and sediment pond design. No water is anticipated leaving the reclaimed site prior to adequate treatment in the form of retention and/or filtration that does not meet and/or exceed UPDES standards.

553.150 The post mining land use of wildlife and domestic grazing should be enhanced to some degree with the revegetation of a more desirable seed mix and a vegetative cover in excess of what was present premining.

553.200 Spoil and Waste.

553.210 All underground development waste brought to the surface and coal processing waste generated on the surface as a result of coal processing will be placed in the coal mine waste (~~refuse~~rock slope material) disposal area or shipped to Wildcat loadout, and reclaimed in accordance with R645 regulations.

553.220 Since no spoil will be produced this section does not apply.

553.221 All vegetation and /or organic material will be removed prior to any coal mine waste being stored.

553.222 All useable topsoil or topsoil substitute will be removed from the structural fill and refuse areas prior to use. Table 2-1 shows estimates of salvageable soil by soil type based on current NRCS soil inventories. The location of the soil storage are shown on Plate 5-2. This material will be spread over the recontoured structural fill and refuse areas prior to seeding and mulching.

553.223 Since no spoil will be produced this section does not apply.

553.230 All recontoured areas will be compacted to minimize slippage. The area will then be over laid with topsoil and ripped. In addition the area will be "pock-marked" to minimize the potential for erosion as well as enhance revegetation establishment. It is not anticipated that soil will be disturbed in areas to steep for equipment to operate.

553.240 The ~~refuse and~~ structural fill area~~s~~ will have slopes of less than 8% upon final recontouring and revegetated to enhance the post mining land use of grazing and wildlife habitat.

553.250 The refuse pile (rock slope disposal area) design is shown in appendix 5-7.

553.260 The operator will commit to all applicable R645 regulations relative to disposal of coal processing waste.

553.300 Any combustible materials or acid and toxic forming materials exposed used or produced during mining will be disposed of in the refuse disposal area at Wildcat and treated as refuse. This material will be covered by four feet of fill. Noncoal waste will be disposed of as described in Section 528.331.

553.400 Cut-and-fill terraces may be allowed by the Division

553.410 No cut and fill terraces will be required.

553.420 No terraces will be required for post mining land use.

553.500-540 and 553.600-553.650.500
The only area that falls under these provisions are the reclaimed Horse Canyon mine which lies in the north west portion of the lease area and is addressed under approved MRP Act #0013 (Part "A").

553.223 Since no spoil will be produced this section does not apply.

553.230 All recontoured areas will be compacted to minimize slippage. The area will then be over laid with topsoil and ripped. In addition the area will be "pock-marked" to minimize the potential for erosion as well as enhance revegetation establishment. It is not anticipated that soil will be disturbed in areas to steep for equipment to operate.

553.240 The ~~refuse and~~ structural fill area~~s~~ will have slopes of less than 8% upon final recontouring and revegetated to enhance the post mining land use of grazing and wildlife habitat.

553.250 The refuse pile (rock slope disposal area) design is shown in appendix 5-7.

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553.420 No terraces will be required for post mining land use.

553.500-540 and 553.600-553.650.500
The only area that falls under these provisions are the reclaimed Horse Canyon mine which lies in the north west portion of the lease area and is addressed under approved MRP Act #0013 (Part "A").

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Appendix 5-4

long term to minimize dust and provide good surface for heavy truck traffic as well as facility access. The facility access road will be approximately 24' wide to provide for two lane traffic and will have the appropriate drainage controls to insure long term life and low maintenance. The has been constructed and will be maintained according to the appropriate R645-534 and R645-527 regulations.

New Slope Access / Portal Access Road

The slope access road splits off the facility access road near the north-east corner of the equipment and supply storage area, and follows an alignment that takes into consideration grade and direct access. The slope access road will be used to provide access to the rock slopes which in-turn proved access to the underground workings. The slope access road will be used as access for all men, material and equipment need in the mine. Since the slope access road provides for frequent access for men, equipment and materials for a period of six months or longer the slope access road is classified as a primary road. The slope access road will be designed, constructed, and maintained according to appropriate R645 regulations. The slope access road is shown on Plate 5-2.

~~Coal Pile Road~~

~~The Coal Pile Road is shown on plate 5-2. The Coal Pile Road will be 15' wide and will follow the existing contours approximately 400' from the Portal Access Road to the ROM coal pile. The Coal Pile Road is an ancillary road due to its infrequently used by a front end loader or pickup truck.~~

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APPENDIX 5-7

LILA CANYON MINE

ROCK SLOPE MATERIAL
(Refuse Pile)

~~Some of the Information for Appendix 5-7 is hard copies. Electronic copies do not exist for all information contained within the Appendix.~~

Appendix 5-7
Rock Slope Material
(Refuse ~~Pile~~)

General

The proposed Lila Canyon Mine includes a site and plan for permanent disposal of coal refuse~~, as shown on Plate 5-2.~~ and rock slope materials. Permanent disposal of refuse, other than rock slope material, will be at UtahAmerican Energy's Wild Cat Loadout. Wild Cat has a designed, approved, permanent refuse pile which serves all of UtahAmerican's Mines. Plate 5-2 shows the location of both a temporary refuse pile (rock pile) and the location where the rock slope material will be buried. Although washing of coal is not proposed, it is likely that some coal processing waste will be generated by the operation of the screening plant and from the mine itself. ~~Additional~~The rock slope material (refuse) will be generated by the construction of the rock slopes.

~~Since coal washing is not proposed, the refuse will not contain consolidated reject, which is higher in sulfur. The refuse pile is completely incised and will be compacted and covered with 4' of material. Thus eliminating the potential of water percolation causing problems. Drainage over the compacted pile with 4' of cover will be diverted into the sediment pond.~~ Under ground coal mine waste (refuse), other than the rock slope material, will be temporarily stored in the location shown on Plate 5-2. Once enough material has been collected in the temporary refuse pile, the material will be transported by truck to UEI's Wild Cat Loadout or other approved location, for permanent disposal.

The rock slope work will generate approximately 168,6560 bank cubic yards of underground development waste (rock slope material). Using a 1.5 bulking or swell factor, the total amount of loose yard of rock slope material to be disposed of in the refuse area is estimated to be 258,000 yd^3. ~~See Figure 1, Appendix 5-7 for cross sections of the refuse area and Table 1 for potential refuse storage volumes.~~

The amount of coal processing waste that will be generated by the operation of the screening plant and from the mine itself. ~~The amount of coal processing waste or refuse expected to be generated by this operation~~ is difficult to predict but expected to be very insignificant.

The shop/warehouse will be constructed on the material removed from the rock slopes which will contain a very insignificant amount of coal, if any. Under no circumstances will the material removed from the rock slopes contain enough combustibles to induce or continue combustion. In addition the material will be covered with four feet of

compacted incombustible material making the fire hazzard to the shop/warehouse non existing.

~~Table 1~~
~~Lila Canyon Mine~~
~~Rock Slope - Refuse Storage Area~~

~~X-Section Topsoil Ft2Cover Material Ft2SlopeRock or Refuse Ft2Topsoil VolumeYd3 to PileCover Material Volume Yd3SlopeRock or Refuse Yd3Total Top Soil to Pile Yd3Total Cover MaterialTotal Refuse4+000005+00180300776333.33555.5561437.04333.3555.614376+00315475148291 6.671435.194181.4812501991561 97+00312545140511 61.11888.895346.32411388010965 8+0048770025121479.62305.567253.7389161851821 99+00469787305717 70.42753.710313566189392853110+00439787276616 81.482914.8110783.37343118543931511+00000812.9631457.415122.2281561331144437~~

~~NOTE:~~

~~**Gray area depicts the area of rock slope material. The remainder has been designated for coal processing waste.**~~

~~As can be seen by Table 1 the area identified for refuse disposal is large enough to dispose of approximately 44,437 yd^3 of material. The rock slope material is expected to take up approximately 25,000 leaving approximately 19,500 yd^3 capacity for future underground mine waste and coal processing waste production.~~

~~The~~ The rock slope disposal site will ~~be comprised of two separate sections. The first section (Structural Fill) will be comprised of~~contain the rock from the rock slopes and will not contain any coal. The ~~Structural Fill~~rock slope disposal site will not require an MSHA number. ~~The second section (Refuse Site) will be for the disposal of coal mine waste.~~

The following sections will describe the ground preparation, ~~refuse~~ placement, and reclamation procedures for the ~~refuse area~~rock slope material. All the ~~refuse~~rock slope material will be placed in an incised area.

Ground Preparation

Vegetation and topsoil will be removed from the proposed ~~refuse site~~rock slope storage area and stored in the topsoil pile as shown on Plate 5-2~~ and Figure 1, Appendix 5-7. Subsoil will then be removed from the area as shown on Figure1~~. The subsoil will be pushed to the side using the blade of a caterpillar. The hole that is made by pushing the

subsoil to the side will be filled by refuse material~~, either~~ from the rock slope development ~~and or coal processing waste or underground development waste as per Figure 1~~.

Placement of Rock Slope Material (Refuse)

~~Refuse~~Rock slope material (refuse) will be dumped into the hole created from the removal of the subsoil. The refuse will be placed in the hole ~~as per Figure 1. The refuse will be placed~~ in 12" lifts and compacted using a front end loader. Once the hole is filled to the planned level ~~shown in Figure 1~~ the subsoil will ~~then~~ be placed over the top of the refuse in 12" lifts and compacted with a front end loader, then another hole will be constructed by removing subsoil adjacent to the previous hole. The topsoil removal and storage, subsoil removal, hole being filled with refuse, and subsoil replacement, procedure will be repeated as additional refuse disposal area is needed.

The dumping (placing) of refuse into a prepared hole is NOT the same as "end dumping". End Dumping is defined by the Bureau of Mines as "Process in which earth is pushed over the edge of a deep fill and allowed to roll down the slope."

Refuse Testing

Material from the rock slope portals will be tested ~~five~~three times during their development. The first test will be during the initial startup of the rock slopes~~. T~~, the second~~, third and fourth tests will be when the development reaches 1/4, ½, and 3/4 of the construction phase. The~~ approximately midpoint of the slopes, and the last test will be taken near the completion of the slope project.

~~Material placed in the refuse pile from normal mining operations will be tested approximately every 6,000 tons.~~ Testing parameters for the rock slope material ~~and normal mining refuse~~ will be as per Table ~~2~~1.

Spreading and Compaction

Compaction will take place using a wheeled loader during the filling operation. Upon final reclamation the topsoil will be redistributed over the ~~refuse~~rock slope storage area (refuse) and reclaimed as per chapter 3. The total cover over the ~~refuse~~rock slope material area, when considering the subsoil and topsoil, will be a minimum of 4'.

Pile Configuration and Drainage

The hole created for the ~~refuse~~rock slope material will be filled with ~~refuse~~the slope rock. The subsoil will be redistributed and graded to allow drainage and prevent impoundment of water on the pile. Runoff from the rock slope storage area (refuse ~~pile~~) will ~~drain to~~be directed into the ~~s~~Sediment ~~p~~Pond as shown on Plate 7-5. ~~A berm will be placed along the perimeter of the pile to direct runoff into the Sediment Pond.~~

~~A projected plan and section view of the refuse disposal area is shown on Figure 1 of this Appendix.~~

Site Inspection

The rock slope material storage area (refuse ~~disposal area~~) will be inspected under the supervision of a qualified registered professional engineer during construction; this will continue until the area has been graded, covered, and reseeded. Inspections will include observations of any potential safety hazards, to assure that organic material and topsoil is removed before deposition and that construction and maintenance are being performed in accordance with the design plan.

If such inspection discloses a potential hazard, the inspector will immediately notify the regulatory authority of the hazard and the emergency procedures to be implemented.

~~Copies of the inspection reports will be maintained and available for review.~~

Reclamation

Upon completion of the active mining operation, the topsoil will be redistributed over the previously placed subsoil. Finally, the rock slope material disposal area (refuse) area will be covered with topsoil and seeded according to the approved plan. Runoff from the reclaimed ~~refuse pile~~disposal area will continue to flow to the sediment pond until Phase II Bond Release requirements for the reclaimed site are met.

Factor of Safety

Using Geosystems Software SB-Slope Version 3.0 stability analysis for the refuse pile ~~were run. Calculations were made at cross section 8+00. At this location the refuse depth would be at a maximum. To minimize Factor of Safety,~~was run. To minimize the factor of safety, the minimum strength materials with maximum densities were used in these calculations. Under these conditions the minimum Factor of Safety was 16.19.

TABLE ~~2~~1

Rock Slope Material

List of
Test Parameters for Acid & Toxic Material
(As per personal conversation with Priscilla 12/29/04)

Ph
EC
SAR
Available Boron
Soluble Selenium
Acid Base Potential
Texture
Water Holding Capacity
Total Nitrogen
Nitrate as Nitrogen
% Organic Carbon

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Chapter 5

Appendix 5-8

Reclamation and Enhancement Plan Associated with the Lila Canyon Mine Site

I. Description of Existing Area

The Lila Canyon Mine constitutes approximately 42.6 acres within the disturbed area boundary. For the purpose of reclamation, the total area is divided into two units. The upper unit consists of the water treatment area and the portal pad. The lower unit consists of the majority of the facilities; bath house, parking, shop, and coal handling structures, (See Plate 5-2 Surface Facilities). In addition to the above, there is a spoil/refuse disposal area and a sediment pond. The actual disturbance, pads, silos, coal processing structures, parking constitute a total of ~~25~~33.~~3~~86 acres. The pond is the only structure that will remain through phase 2 bond liability.

This new disturbance constitutes a loss of approximately 40 acres of critical high value big game winter range. In addition, it distracts from the general aesthetics of the upper reaches of Lila Canyon.

The following reclamation plan is designed to rehabilitate this area to such a degree that the appearance would be aesthetically compatible with the adjacent undisturbed area and reestablish a desirable and diverse vegetative cover that will enhance wildlife habitat and domestic grazing.

II. Demolition and Clean Up

After abandonment the area will be cleared of all mine related material and structures. The majority of the coal handling equipment; belt lines, conveyors, and some of the metal fab buildings, will be sold as used equipment and removed prior to demolition. The balance of the structures will be demolished utilizing heavy equipment such as; dozers, loaders, trackhoes, various shears for steel dismantling etc. The trash (non metal, non concrete material) will be removed from the site and hauled to an approved land fill. Any contaminated soil or debris, such as coal refuse, that has petroleum additives would be hauled to an approved disposal site. The balance of the non-combustible, non-ferrous debris such as concrete would be buried on site.

All material with salvage value would be removed by a licensed salvage company.

III. Reclamation Plan

Following the cessation of mining, the portal cuts can be brought back to approximate original contours.

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chapter 7

List of Appendices

List of Plates

List of Figures

List of Tables

contact between the rock slopes and the coal seam will be 1227' from the surface at an elevation of 6300'. Ground water levels in the mining area, based on the 3 water monitoring

holes and other geologic data, appear to be nearly static at elevation 5990 in this area (see Figure 7-1).

Water level in the mine would have to raise approximately 310' to reach the rock slope/coal seam contact and result in a gravity discharge. Water monitoring results and other historical data in the area do not indicate this is likely to occur.

731.522 Surface Entries after January 21, 1981 This is not known to be an acid-producing or iron-producing coal seam; however, proposed portals are located to prevent gravity discharge from the mine (see Section 731.521).

731.600 Buffer Zones All streams within the permit area are either ephemeral or intermittent by rule with ephemeral flow. In the area of the surface facilities along the intermittent by definition Lila Wash, the Operator will install stream buffer zone signs in locations shown on Plate 5-2 and maintain the buffer zones during the operation.

731.700 Cross Sections and Maps The following is a list of cross-sections and maps provided in this section of the P.A.P.

Plate 7-1	Permit Area Hydrology Map
Plate 7-2	Disturbed Area Hydrology/Watershed
Plate 7-3	Water Rights Locations
Plate 7-4	Water Monitoring Location Map
Plate 7-5	Proposed Sediment Control Map
Plate 7-6a	Proposed Sediment Pond #1
Plate 7-6b	Proposed Sediment Pond #2
Plate 7-7	Post-Mining Hydrology

All required maps and cross-sections have been prepared by, or under the supervision of, and certified by a Registered Professional Engineer, State of Utah.

731.710 General Area Hydrology Plate 7-1.

731.720 Plate 7-2.

731.730 Water Monitoring Map Plate 7-4.

731.740 Sediment Pond Map Plate ~~7-6~~s 7-6a and 7-6b.

731.750 Plate ~~7-6~~7-6a & b.

731.760 Other Maps (See Section 731.700 for a complete list of maps provided in this section).

731.800 Water Rights and Replacement (See Section 727)

732. Sediment Control Measures

732.100 Siltation Structures The only proposed siltation structure for this site is the sediment pond. All disturbed area runoff is proposed to be directed to this pond for final treatment prior to discharge.

The sediment pond will be constructed and maintained in compliance with applicable regulations. Details of the proposed pond are discussed in the following section and in Appendix 7-4.

732.200 Sedimentation Ponds As discussed above, all disturbed area runoff is proposed to be directed to a sediment pond for final treatment prior to any discharge. The proposed sediment pond will be located at the low point of the disturbed area, as shown on Plate 7-5.

732.210 Sediment Pond Details The proposed sediment pond is considered temporary, and will be removed during final reclamation. The pond is designed in compliance with the requirements of the following sections, as required:

culverted crossings over ephemeral drainages. There are no plans to alter or relocate any intermittent or perennial drainages in conjunction with road construction.

Road construction and design details are provided in Chapter 5 of this P.A.P. Road drainage and culvert design details are provided in Appendix 7-4.

732.420 Culverts Culvert details are provided in Appendix 7-4. All undisturbed culvert inlets will be provided with headwall protection, consisting of inlet sections, rock or concrete.

733. Impoundments The only water impoundment proposed for this site is the sediment pond. Design details for the pond are provided in Appendix 7-4 and on Plate ~~7-6~~s 7-6a &b.

733.100 General Plans The general plan for this site is to drain runoff from the disturbed area into a single sedimentation pond for treatment prior to discharge. Site drainage and design details are described in Appendix 7-4. The general plan includes the following, at a minimum:

733.110 Certification The sediment control plan and proposed sediment pond designs have been prepared and certified by a Registered Professional Engineer, State of Utah.

733.120 Maps and Cross Sections Sediment pond locations, design plans and cross sections are provided on Plates 7-5 and ~~7-6~~7-6a & b, respectively.

733.130 Narrative A complete description of the proposed sediment pond along with volumes and design/construction details in provided in Appendix 7-4.

733.140 Survey The proposed sediment pond is not located within a potential subsidence area from past underground mining operations.

733.150 Hydrologic and Geologic Information Relevant hydrologic and geologic information for the sediment pond is provided in Appendix 7-4.

742.110 Designed/Constructed/Maintained Appropriate sediment control measures will be designed, constructed and maintained using the best technology currently available to:

742.111 "Prevent, to the extent possible, additional contributions of sediment to stream flow or to runoff outside the permit area;"

This will be accomplished by the construction of undisturbed diversions to allow most undisturbed runoff to by-pass the site and by routing all disturbed runoff to ~~a~~ sediment ponds for treatment prior to discharge.

742.112 "Meet the effluent limitations under R645-301-751;"

Any discharge from the sediment ponds will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

742.113 "Minimize erosion to the extent possible:" This will be accomplished by proper routing of drainage, and by the use of energy dissipators and/or erosion protection at all sediment pond, ditch and culvert outlets and in ditches where erosive velocities are expected.

742.120 Sediment Control Measure Sediment control measures within and adjacent to the disturbed areas are detailed in Appendix 7-4. These measures include, but are not limited to:

742.121 As discussed in Appendix 7-4, runoff from the disturbed area will be captured in ~~a~~ sediment ponds and/or treated as necessary to meet effluent limitations prior to discharge.

742.122 As discussed in Appendix 7-4, the majority of undisturbed drainage from above the mine site will be diverted via designed undisturbed diversions.

742.123 Undisturbed diversions will consist of properly designed and protected channels and/or culverts as described in Appendix 7-4.

742.124 The primary means of velocity reduction is planned to be the use of rip-rap; however, other methods such as straw dikes, check dams and/or vegetative filters may be employed during the operational or reclamation phases as determined necessary, and with Diversion approval.

742.125 There are no plans to treat runoff with chemicals. Based on extensive experience with runoff in this area, effluent requirements for discharge can normally be met by containment and settling in a sediment pond.

742.126 It is expected that water will be encountered in the underground mining; however, this water will be used for mining needs and only discharged when no further storage is available underground. Any discharge of mine water will meet applicable effluent limitations. Such water will be sampled (and treated if necessary) prior to discharge.

742.200 Siltation Structures As described in Appendix 7-4 the sediment ponds will provide for sediment removal for most of the surface facility disturbance. An alternate sediment control method of berms and silt fences will be used at the fan site. The description of this alternate sediment control method is also described in Appendix 7-4. This is necessary due to its remote location and rough terrain. Other sediment structures that might be used around the surface facilities are temporary sediment traps such as straw dikes and/or catch basins.

742.210 General Requirements Siltation structures will be designed, constructed and maintained in accordance with the following regulations.

742.211 Siltation structures will be constructed using the best technology currently available to prevent additional contributions of suspended solids and sediment to streamflow outside the permit area to the extent possible. Sediment control structures and details are discussed in Appendix 7-4.

742.212 The siltation structures (i.e. sediment ponds) will be constructed prior to any coal mining and reclamation operations. Upon construction, the ponds and any other siltation structures will be certified by a qualified registered professional engineer to be constructed as designed and approved in the reclamation plan.

742.213 The sediment ponds will be designed, constructed and maintained in accordance with all applicable regulations. See 732.200, 733.200 and Appendix 7-4 for details.

742.214 Any discharge of water from underground workings to surface waters will meet applicable effluent limitations of 751. If such water is found not to meet those requirements, the water will be treated underground prior to discharge, or passed through a siltation structure prior to leaving the permit area.

742.220 Sedimentation Ponds The sedimentation ponds will meet the following criteria:

742.221.1 The ponds will be used individually;

742.221.2 The pond~~is~~s are located at the lower end of the disturbed area and out of any perennial stream (See Plate 7-5);

742.221.3 The sediment ponds will be designed, constructed and maintained to:

742.221.31 The pond~~is~~s are designed to contain the runoff from a 10 year - 24 hour precipitation event for the area in addition to a minimum of 2 years of sediment storage.

742.221.32 The pond~~is~~s are designed to provide a minimum of 24 hour retention of the runoff from a 10 year - 24 hour precipitation event.

742.221.33 The pond ~~is~~s are designed to contain the runoff from a 10 year - 24 hour precipitation event plus a minimum of 2 years of sediment storage.

742.221.34 A nonclogging dewatering device ~~is~~s are proved as described in Appendix 7-4.

742.221.35 This will be accomplished by proper design, construction and maintenance of the ponds as described in Appendix 7-4.

742.221.36 As discussed in Appendix 7-4, sediment will be removed when the level reaches the 2 year storage level. Since the pond is oversized, this leaves adequate room for storage of the design event.

742.221.37 The sediment ponds construction ensures against excessive settlement. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.38 Sediment ponds will be free of sod, large roots, frozen soil, and acid- or toxic-forming coal processing waste. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.221.39 The sediment ponds will be compacted properly. See "Sediment Pond Construction Requirements" in Appendix 7-4.

742.222 Sediment Ponds Meeting MSHA Criteria The proposed ponds do~~es~~ not meet the size or other qualifying criteria of MSHA, 30 CFR 77.216(a). Therefore, this section is not applicable.

742.223 Sediment Ponds Not Meeting MSHA Criteria As discussed in Appendix 7-4, the ponds will be equipped with ~~a~~ principle spillway ~~culvert~~ and ~~an open channel~~emergency spillway culverts each sized to safely discharge runoff from a 25 year - 6 hour precipitation event.

742.223.1 The Principle Spillway ~~culvert is~~ culverts and the Emergency ~~Overflow C~~Spillway culverts will be corrugated, metal pipe. Each one designed to carry sustained flows.

742.223.2 N/A - See 742.223.1

742.224 N/A - See 742.223.1

742.225 N/A - No exception requested.

742.225.1 N/A

742.225.2 N/A

742.230 Other Treatment Facilities No other treatment facilities are planned for this operation. Therefore, Section 742.230 is not applicable.

742.240 Exemptions No exemptions are requested at this time; however, since this is a new proposed operation, the need for Small Area Exemptions and/or Alternate Sediment Control Areas may arise in the future.

742.300 Diversions

742.310 General Requirements

742.311 All diversions are considered temporary, and will be removed upon final reclamation.

Diversions are designed to minimize adverse impacts to the hydrologic balance within the permit and adjacent areas, to prevent material damage outside the permit area and to assure the safety of the public detailed diversion designs are presented in Appendix 7-4 of this P.A.P.

742.312 See Appendix 7-4 for diversion designs.

742.313 As indicated, all diversions for the Lila Canyon Mine are temporary, and will be removed when no longer needed. Land disturbed by removal will be reclaimed in

accordance with R645-301 and R645-302. Prior to diversion removal, downstream water treatment facilities will be modified or removed. See Reclamation Hydrology Section of Appendix 7-4.

742.320 Diversion of Perennial and Intermittent Steams Section 742.320 is not applicable since there are no diversions planned for perennial or intermittent streams within the permit area.

742.330 Diversion of Miscellaneous Flows All diversions within the permit area are of miscellaneous flows.

742.331 Certain miscellaneous undisturbed flows are proposed to be diverted around the disturbed area. Other flows are diverted within the disturbed area and to the sediment ponds, as described in Appendix 7-4.

742.332 See Appendix 7-4.

742.333 All temporary diversions are designed to safely pass the peak runoff of a 10-year 6-hour event resulting in a more robust design that the required 2-year 6-hour precipitation event. See Appendix 7-4 for details.

742.400 Road Drainage

742.410 All Roads All roads are designed in accordance with requirements of 534. Drainage control for all roads is discussed in detail in Appendix 7-4. No part of any road is planned to be located in the channel of an intermittent or perennial stream. As shown on Plate 7-2, roads are located to minimize downstream sedimentation and flooding.

742.420 Primary Roads Primary road design is discussed under 534.

742.421 As described in Section 534, all primary roads are to be located, insofar as practical, on the most stable available surfaces.

742.422 There are no stream fords planned for this operation.

742.423 Drainage Control Road drainage control is discussed in Appendix 7-4.

742.423.1 Primary roads will be equipped with adequate drainage control, including ditches, culverts and relief drains. The drainage control system is designed, and will be constructed and maintained, to pass the peak runoff safely from a 10 year - 6 hour precipitation event, as described in Appendix 7-4.

742.423.2 Culvert design and installation details are described in Appendix 7-4. Inlets and outlets are protected from erosion. Undisturbed culvert inlets are to be equipped with trash racks.

742.423.3 Drainage ditch design details are provided in Appendix 7-4.

742.423.4 There are plans to alter the drainage channel on the south boundary of the disturbed area. This drainage is an ephemeral channel with no riparian habitat. A stream alteration permit will not be required for this channel. A 60 inch culvert and a sedimentation pond will be placed in this channel. Installation of this culvert and sedimentation control plans are described in Appendix 7-4. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond area will be submitted prior to commencement of final reclamation of this area.

742.423.5 Stream channel crossings will be provided by culverts designed, constructed and maintained using current, prudent engineering practice, as described in Appendix 7-4.

743. Impoundments

743.100 General Requirements All impoundments associated with this operation are considered temporary.

743.110 Not applicable there are no impoundments planned that meet the criteria of MSHA, 30 CFR 77.216 (a).

743.120 The design of impoundments have been prepared and certified by a qualified, registered professional engineer. As described in Appendix 7-4, the proposed sediment ponds will have at least 2' of freeboard above the highest flow level in the emergency spillway, which is adequate to resist overtopping by waves and by sudden increases in storage volumes.

743.130 As described in Appendix 7-4, the sediment ponds will be equipped with a culvert riser principal spillway and a culvert riser emergency overflow sized to safely pass the runoff from a 25 year - 6 hour precipitation event.

743.131 The principal spillway design is discussed below.

743.131.1 The principle spillway will be constructed of corrugated metal pipe. The emergency spillway will also be constructed of corrugated metal pipe.

744. Discharge Structures

744.100 The sediment pond emergency spillway will be a vertical corrugated metal pipe. It will flow into a 60" diameter C.M.P. beneath the pond and discharge onto an engineered rip-rap apron to prevent scouring or erosion. (See Appendix 7-4).

Diversions and culvert outlets that are expected to have flow velocities in excess of 5 fps will also be equipped with erosion and velocity controls as described in Appendix 7-4.

744.200 Discharge structures have been designed and certified according to standard engineering design procedures. (See Appendix 7-4).

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Revised document: @PFDesktop\:MyComputer\T:\HD-ProjectBackup\UtahAmerican\Lila Hydrology-2008\Appendix 74Lila Canyon MineSedimentation and Drainage Control.wpd
Deletions are shown with the following attributes and color:
~~Strikeout~~, Blue RGB(0,0,255).
Deleted text is shown as full text.
Insertions are shown with the following attributes and color:
Double Underline, Redline, Red RGB(255,0,0).

The document was marked with 610 Deletions, 651 Insertions, 0 Moves.

Appendix 7-4

Appendix 7-4
Lila Canyon Mine
Sedimentation and Drainage Control Plan

Revised
January 2001
October 2002 RJM
February 2007 TJS
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SEDIMENTATION AND DRAINAGE CONTROL PLAN

TABLE OF CONTENTS

Section **Page Number**

SEDIMENTATION AND DRAINAGE CONTROL PLAN

1- Introduction

The Sedimentation and Drainage Control Plan for the Lila Canyon Mine has been designed according to the State of Utah R645- Coal Mining Rules, November 1, 1996. All design criteria and construction will be certified by a Utah Registered Professional Engineer.

This plan has been divided into the following three sections:

1) Design of Drainage Control Structures for the Proposed Construction

2) Design of Sediment Control Structures

3) Design of Drainage Control Structures for Reclamation

The general surface water control plan for this project will consist of the following:

(a) This is a new site construction. All areas proposed for disturbance will be sloped to drain to surface ditches and/or culverts where runoff will be carried to ~~the~~wo sediment ponds. All minesite drainage controls and watersheds are shown on Plate 7-5 "Proposed Sediment Control Map".

(b) The majority of undisturbed runoff will be diverted around the minesite and beneath the sediment pond #1 by properly sized culverts. Undisturbed diversion culvert UC-1, is located on the northwest end of the site. This diversion will allow the majority of undisturbed runoff from the Right Fork of Lila Canyon to bypass the mine area beneath ~~the~~ sediment pond #1. All undisturbed diversions are designed to carry runoff from a 100 year - 6 hour precipitation event. UC-1 is oversized at 60" diameter.

(c) ~~A single,~~Two adequately sized sediment ponds will be constructed at the lower end of the site. ~~This~~These pond ~~is~~s are sized to contain and treat the runoff from all of the disturbed area and any contributing undisturbed areas for a 10 year - 24 hour precipitation event. The ponds will be equipped with ~~a~~ C.M.P. culvert principle spillway and decant~~,~~ and ~~a second~~ CMP culvert emergency spillway sized to safely pass runoff from a 25 year - 6 hour precipitation event. ~~S~~The spillways from sediment pond #1 will discharge into ~~a 60"~~the UC-1 CMP culvert running beneath the pond. This culvert will discharge onto an engineered discharge structure and into the Right Fork of Lila Canyon channel below the minesite. The spillways from sediment pond #2 will discharge onto an engineered discharge structure and into the Middle Fork of Lila Canyon channel below the minesite.

DESIGN OF DRAINAGE CONTROL STRUCTURES

Design Parameters:

Tables:

Figures:

Design Parameters

2.1 Precipitation

The precipitation-frequency values for the area were taken from the approved Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III, submitted by I.P.A.

Frequency - Duration	Precipitation
10 year - 6 hour	1.30"
10 year - 24 hour	1.90"
25 year - 6 hour	1.50"
100 year - 6 hour	1.90"

2.2 Flow

Peak flows, flow depths, areas and velocities were calculated using the computer program "Office of Surface Mining Watershed Model", Storm Version 6.21 by Gary E. McIntosh. All flows are based on the SCS - TR55 Method for both SCS 6-hour and NOAA Type II, 24-hour storms.

Time of concentration of storm events was calculated for each drainage area using the SCS upland curve method included as part of the Storm software. For the undisturbed areas UA-1 ~~through~~and UA-4 the watershed type was set at forested and the curve condition was set at bare ground. For UA-~~5~~6a and ~~UA-6a, b, &c~~UA-6b and all DA watersheds, the watershed type was set as disturbed and the curve condition was set at bare ground.

2.3 Velocity

Flow velocities for each ditch structure were calculated using the Storm computer program with Manning's Formula:

$$V = \frac{1.49}{n} R^{2/3} S^{1/3}$$

where:

V	=	Velocity (fps)
R	=	Hydraulic Radius (ft.)
S	=	Slope (ft. per ft.)
n	=	Manning's n; Table 3.1, p. 159,

"Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner & Haan, 1983.

Note: The following Manning's n were used in the calculations:

Structure	Manning's n
Culverts (cmp)	0.025
Unlined Disturbed Area Ditches	0.035

2.4 Drainage Areas

All drainage areas were planimetered directly from either Plate 7-1, "Permit Area Hydrology Map", and Plate 7-2, "Disturbed Area Hydrology/Watershed".

2.5 Slopes, Lengths

All slopes and lengths were measured directly from the topography on Plates 7-1 and 7-2.

2.6 Runoff Volume

Runoff was calculated using the SCS Formula for NOAA Type II, 24-hour storms; using the Storm Version 6.21 computer program:

$$Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S}$$

where:

CN	=	Runoff Curve Number
Q	=	Runoff in inches
P	=	Precipitation in inches
S	=	$\frac{1000}{CN} - 10$

2.7 Runoff Curve Numbers

Two curve numbers were utilized for the undisturbed areas. Areas with milder slopes (less than 30%) were given a runoff curve number of 75. All other undisturbed areas (30% slope or greater) were given a runoff curve number of 83. These numbers were taken directly from the approved "Mining and Reclamation Plan, Horse Canyon Mine, Emery County, Utah, Volume III", submitted by I.P.A. The numbers in that plan were based on vegetation and soils data from on-site.

Two other runoff curve numbers have been used in the calculations. A runoff CN of 90 is used for all disturbed areas (including the areas designated as undisturbed which lie within the disturbed area boundary (See Plate 7-2), and a runoff CN of 95 is used for paved areas. These numbers are based on commonly used and approved values and from Table 2.20, (p. 82, Barfield, et al, 1983).

The following is a summary of runoff curve numbers used in these calculations:

Watershed	Runoff CN
Undisturbed (<30% slopes):	75
Undisturbed (>30% slopes):	83
Disturbed:	90
Paved:	95

2.8 Culvert Sizing

Minimum culvert sizing is based on the ~~following~~either the inlet control nomograph or Manning's Equation~~; using~~. Culverts were evaluated for inlet control conditions to determine the minimum pipe size using the Culvert Nomograph included as Figure 1 of this Appendix. If the pipe had a HW/D ratio equal to or greater than 1.0 or the slope were less than 2% the Haestad Methods, Flowmaster, Version 6.0 computer program was used to determine the pipe flow diameter using:

$$D = \left(\frac{2.16\ Q\ n}{\sqrt{S}}\right)^{0.35}$$

where:

	D	=	Required Diameter (feet)
	Q	=	QP = Peak Discharge (cfs)
	n	=	Roughness Factor (0.025 for CMP)
	S	=	Slope (ft. per ft.)

~~Using the above formula, minimum required culvert barrel sizes were calculated for each applicable area. Culverts were then evaluated for inlet control conditions to determine if additional pipe size was required above the pipe flow minimum. The Culvert Nomograph included as Figure 1 of this report was used for this evaluation.~~

2.9 Culverts

Culverts have been sized according to the calculations previously described, and are shown on Plate 7-5, "Proposed Sediment Control Map". Culverts carrying undisturbed drainages are designated with UC- Letters (i.e. UC-1). All undisturbed area drainage culverts will be fitted with trash racks to minimize plugging by rocks or other debris.

Trash racks will be provided at the inlet for all undisturbed drainage culverts. These will consist of 3/4" steel bars welded on 6" centers across the flared inlet structures of each culvert. Bars will be sloped from the front of the inlet structure up to the top of the culvert. This ramp configuration will allow trash, branches and other potential obstructions to be swept up and away from the inlet rather than being impinged against the grates during a flow event. Rip rap will be placed around the flared inlet structure and above it to a height of at least 6" above the required headwall for each culvert. (See Figure 4 for details). Trash racks will be checked on a routine schedule and following precipitation events and all trash, branches and other obstructions will be removed.

It should be noted that all undisturbed area culverts are adequately sized to handle the expected runoff from a 100 year - 6 hour event for maximum protection of the mine area, sediment pond and undisturbed drainage. This is well in excess of the 10 year - 6 hour event required by the regulations and is proposed as an extra measure of safety.

Disturbed area culverts and ditches are shown on the "Sediment Control Map", Plate 7-5. Culverts carrying disturbed drainage are designated with a DC-number (i.e. DC-1). Calculations for all disturbed area culverts and ditches are also included with this report, along with design criteria. Disturbed drainage areas draining to culverts and ditches are marked with a DA-number (i.e. DA-1). Undisturbed drainage areas are marked with a UA-number (i.e. UA-1).

Culverts will be inspected regularly, and cleaned as necessary to provide for passage of drainage flows. Inlets and outlets shall also be maintained so as to prevent plugging or undue restriction of water flow.

All disturbed area culverts are temporary, and will be removed upon final reclamation.

2.10 Main Canyon Culvert - Outlet Structure

The outlet of ~~the 5' diameter~~ culvert UC-1 has been designed to flow onto a rip-rap apron to protect against souring and to allow for energy dissipation. The rip-rap apron is designed to fit the natural channel configuration as closely as possible, and will allow runoff to re-enter the natural channel at a reduced velocity which is no greater than natural flow conditions. Runoff from the 100 year - 6 hour precipitation event in the canyon below the minesite has been calculated at ~~63.16~~52.32 cfs, including sediment pond overflow.

The rip-rap apron design is based on Figure 7-26, Design of Outlet Protection - Maximum Tailwater Condition, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983. Based on the figure, the apron should be a minimum of 15' in length, widening from 5' to 9', with a ~~0%~~0.1% slope. The proposed length has been increased to 20', to ensure adequate time for velocity reduction. The apron slope is kept at ~~0%~~0.1%. Rip-rap size is conservatively placed at 12" D_{50}. Rip-rap will be placed to a depth of 1.5 D_{50} and will be placed on a 6" layer of 2" drain rock filter. Rip-rap will also be placed on the 2H:1V side slopes to the height of the culvert (~~5'~~4') at the culvert outlet tapering to ~~2'~~3' at the outlet of the apron. This rip-rap apron has been sized and designed to adequately dissipate energy from flow velocities of a 100 year - 6 hour precipitation event and resist dislodgement. The drain rock filter bed will also serve to secure the rip-rap boulders firmly in place, to add an additional element of stability, and prevent scouring underneath the armored apron. (See Figure 4A for construction details). The natural channel below the culvert has a gradient of approximately 7.76%. When the flow is routed from the culvert across the apron to the natural channel, the velocity is reduced from ~~12~~4.~~66~~79 fps at the culvert outlet to ~~4~~1.~~12~~50 fps at the outlet of the apron. (See Culvert Outlet Rip-Rap Apron Flow Velocity Calculations in Appendix 1.)

It should be noted that these calculations are based on a 100 year - 6 hour event.

2.11 Ditches

All ditches will carry disturbed area drainage to the pond. Ditches are shown on the Proposed Sediment Control Map, ~~Map~~Plate 7-5, and are designated with a DD-number (i.e. DD-1 for Disturbed Area Ditches) or UD-number (i.e. UD-1 for Undisturbed Area Ditches).

All ditches are designed to carry the expected runoff from a 10 year - 6 hour event with a minimum freeboard of 0.5' (See Table 8 and Figure 3).

Ditches which exhibit expected flow velocities of 5 fps or greater will be lined with rip-rap. ~~T~~A typical ~~cross-sections,~~cross-section is shown on Figure 3 and flow depths and areas for all lined and unlined ditches are ~~shown on Figure 3~~presented in Table 8 of this report.

Ditch slopes have been determined from Plates 7-2 and 7-5.

All ditches will be inspected regularly, and maintained to the minimum dimensions to provide adequate capacity for the design flow. All ditches are temporary and will be removed as described under the reclamation hydrology section. (Section 4)

TABLE 1

Table 1 Undisturbed Watershed Summary		
Watershed	~~CNAcres~~Drains To	Final
UA-1	~~75248.41~~UC-1	Lila Canyon
UA-2	~~8311.74~~DD-2	Sediment Pond
~~UA-3835.98DD-5~~UA-4	Sediment Pond	~~UA-4837.20~~Sediment Pond
UA-6a	DD-12	Sediment Pond
~~UA-59012.27UC-1Lila CanyonUA-6a901.60~~UA-6b	DD-1~~2~~1	Sediment Pond
~~UA-6b902.55DD-11Sediment PondUA-6c752.61~~UA-7	ASCA Area	~~Sediment Pond~~Lila Canyon

TABLE 2

Table 2 Disturbed Watershed Summary		
Watershed	~~CN~~Acres Drains To	Final
~~DA-2902.45~~DA-1a	DD-~~2~~1a	Sediment Pond
~~DA-3902.92~~DA-1b	DD-~~3~~1b	Sediment Pond
~~DA-4902.63~~DA-1c	DD-1~~4~~c	Sediment Pond
~~DA-5900.56~~DA-2a	DD-~~5~~2a	Sediment Pond
~~DA-6955.10~~DA-2b	~~DC-8~~DD-2b	Sediment Pond
~~DA-7956.86~~DA-2c	DD-~~10~~2c	Sediment Pond
~~DA-8900.58~~DA-3	DD-~~1~~3	Sediment Pond
~~Total~~ DA-4a	DD-4a	Sediment Pond
DA-4b	DD-4b	Sediment Pond
DA-4c	DD-4c	Sediment Pond
DA-5a	DD-5a	Sediment Pond
DA-5b	DD-5b	Sediment Pond
DA-5c	DD-5c	Sediment Pond
DA-6a	DD-6a	Sediment Pond
DA-6b	DD-6b	Sediment Pond
DA-6c	DD-6c	Sediment Pond
DA-7	DD-7	Sediment Pond
DA-8a	DD-8a	Sediment Pond
DA-8b	DD-8b	Sediment Pond
DA-8c	DD-8c	Sediment Pond
DA-9	DD-9	Sediment Pond
DA-10	DD-10	Sediment Pond
DA-11	DD-11	Sediment Pond
DA-13a	DD-13a	Sediment Pond
DA-13b	DD-13d	Sediment Pond
DA-13c	DD-13e	Sediment Pond
DA-14a	DD-14a	Sediment Pond 2
DA-14b	DD-14b	Sediment Pond 2
DA-15a	DD-15a	Sediment Pond 2
DA-15b	DD-15b	Sediment Pond 2
DA-16a	DD-16a	Sediment Pond 2
DA-16b	DD-16b	Sediment Pond 2
DA-17a	DD-17a	Sediment Pond 2
DA-17b	DD-17b	Sediment Pond 2
DA-18a	DD-18a	Sediment Pond 2
DA-18b	DD-18b	Sediment Pond 2
TS-1	Topsoil Berm	Sediment Pond
POND	Sediment	Sediment Pond

TABLE 3

Table 3 Watershed Parameters					
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Undisturbed Watersheds					
UA-1	248.41	5200	1480	28.46	75
UA-2	11.7410.01	1500	1000	66.67	83
UA-34	514.9808	65016525.398	595	47.76	83
UA-	1.6045	47040230	880	34.5170	90
UA-6b	20.55840840	6090	730	33.1433	90
UA-6cUA-7	0.60	195	225	12.61650880	406.1590
Disturbed Watersheds					
DA-21a	20.4533	680	1520152	22.35	95
DA-1b	0.31	420	48	11.43	95
DA-1c	0.20	225	20	8.89	95
DA-2a	0.93	680	190162	23.82	95
DA-2b	0.14	350	36	10.29	95
DA-2c	0.10	106	16	15.10	95
DA-3	0.30	170	16	9.41	90
DA-4a	0.14	100	12	12.5000	95
DA-4b	0.12	270	28	10.37	95
DA-4c	0.60	580	54	9.31	95
DA-5a	0.07	180	24	13.33	95
DA-5b	0.33	125	14	11.20	90
DA-3a5c	10.3442	570	54	350406.159.4	905
DA-3bDA-6a	0.28	2.156759514.	DA-454	2.6333025727	90
DA-6DA-6b	3.35	760	70	9.21	90
DA-6c	2.51	690	70	10.14	90
DA-7	2.68	630	30	4.76	95
DA-8a	0.26	284	554	19.1001	90
DA-8b	0.76	670	52	7.80	90
DA-8c	0.95	410	55042	10.24	90
DA-9	0.05	50	6	12.00	95
DA-10	2.89	700	20	2.86	95
DA-11	0.78	340	16	4.70	95
DA-13a	1.97	470	12	2.55	95
DA-13b	0.49	280	4	1.43	90
DA-13c	0.40	460	22	4.78	90
DA-14a	0.36	390	34	8.71	95
DA-14b	0.75	540	16	2.96	95

TABLE 3

Table 3 Watershed Parameters					
Watershed	Area (Acre)	Hydraulic Length (ft.)	Elevation Change (ft.)	% Slope	CN
Disturbed Watersheds					
DA-15a	0.38	525	50	9.~~0995DA-7~~52	95
DA-15b	0.62	270	12	4.44	95
DA-16a	0.16	370	10	2.70	95
DA-16b	0.09	210	13	6.19	95
DA-17a	0.42	~~6.86700~~610	~~50~~19	~~7~~3.1~~4~~1	95
~~DA-8~~DA-17b	0.~~58~~07	100	5	5.00	95
DA-18a	0.07	175	6	~~350~~3.43	95
DA-18b	0.44	650	~~25~~24	3.69	95
~~7~~TS-1	2.95	660	38	5.75	83
POND	1.92	380	50	13.1~~4~~6	9~~0~~5

TABLE 4

Table 4 Runoff Summary Undisturbed Watersheds (Not Draining to Ponds)					
Watershed	**10 yr. / 6 hr. Peak Flow - cfs**	**25 yr. / 6 hr. Peak Flow - cfs**	**100 yr. / 6 hr. Peak Flow - cfs**	**10 yr. / 24 hr. Peak Flow - cfs**	**10 yr. / 24 hr. Volume - ac.ft.**
UA-1	7.02	10.31	20.48	25.53	6.90
UA-57	5.947.65110.221	0.27	0.40	120.1443	10.03
Totals12.9617.9631.7237.677.93					

TABLE 5

Table 5
Runoff Summary
Watersheds ~~Draining~~ Drainage to Sediment Pond

Watershed	10 yr. / 6 hr. Peak ~~Flow~~	25 yr. / 6 hr. Peak ~~Flow~~	10 yr. / 24 hr. Peak ~~Flow~~	10 yr. / 24 hr. ~~Volume~~
~~DA-2~~Undisturbed Watersheds draining to Pond #1				
UA-2	~~1~~2.11	~~1~~3.11	6.11	0.52
UA-4	3.14	4.65	9.20	0.74
UA-6a	0.~~45~~47	0.60	0.95	~~2~~0.12
UA-6b	0.~~34~~10	0.13	0.21	~~DA-3a0.55~~0.03
Disturbed Watersheds draining to Pond #1				
DA-1a	0.22	0.26	0.37	0.04
DA-1b	0.20	0.24	0.33	0.04
DA-1c	0.11	0.14	0.19	0.02
DA-2a	0.61	0.7~~1~~3	1.~~12~~03	0.11
DA-~~3~~2b	~~1~~0.09	0.10	0.15	0.02
DA-2c	0.04	~~1~~0.05	0.08	0.01
DA-3	0.~~34~~11	0.14	~~2~~0.21	0.03
DA-4a	0.06	0.08	0.11	0.02
DA-4b	0.07	0.08	0.12	0.~~19~~01
~~DA-~~	0.~~22~~42	0.51	0.71	0.07
~~DA-5~~DA-5a	0.05	0.06	0.09	0.01
DA-5b	0.11	0.14	0.~~2~~21	0.03
DA-5c	0.~~26~~29	0.35	0.4~~1~~9	0.05
~~DA-6~~DA-6a	0.09	0.12	0.18	0.02
DA-6b	1.60	2.06	3.~~053.695.17~~27	0.~~59~~28
DA-6c	1.18	1.52	2.40	0.21
DA-7	~~4~~1.~~55~~98	~~52~~.~~49~~39	~~73~~.~~70~~36	0.31
DA-8a	0.10	0.~~79~~12	0.19	0.02
DA-8b	0.36	0.47	0.74	0.06
DA-8c	0.40	0.52	0.81	0.08
DA-9	0.04	0.05	0.07	0.01
DA-10	2.19	2.65	3.73	0.33
DA-11	0.52	0.63	0.89	0.09
~~DA-8~~DA-13a	1.46	1.76	2.47	0.23
DA-13b	0.23	0.30	0.47	0.04
DA-13c	0.19	0.24	0.38	0.03
TS-1	0.65	0.96	1.90	0.15
POND	1.18	1.42	1.99	0.22
TOTAL		26.58		3.95

TABLE 5

Table 5 Runoff Summary Watershed Drainage to Sediment Pond				
Watershed	10 yr. / 6 hr. Peak Flow-cfs	25 yr. / 6 hr. Peak Flow-cfs	10 yr. / 24 hr. Peak Flow-cfs	10 yr. / 24 hr. Volume-ac-ft
Disturbed Watersheds draining to Pond #2				
DA-14a	0.23	0.28	0.39	0.04
DA-14b	0.56	0.67	0.95	0.09
DA-15a	0.26	0.31	0.44	0.04
DA-15b	0.40	0.48	0.67	0.07
DA-16a	0.11	0.14	0.19	0.02
DA-16b	0.06	0.07	0.10	0.01
DA-17a	0.31	0.38	0.53	0.05
DA-17b	0.05	0.06	0.09	0.01
DA-18a	0.06	0.07	0.10	0.01
DA-18b	0.33	0.40	0.526	0.05
~~UA-2~~TOTAL	~~1.49~~	2.3086	~~5.020.61UA-~~	0.31~~UA-~~

TABLE 6

Table 6 Runoff Control Structure Watershed Summary		
Structure	Type	Contributing Watersheds/Structures
UC-1	Culvert	UA-1, UA-57, Sediment Pond Overflow
DD-2DD-1a	Ditch	DA-1a
DD-1b	Ditch	DD-1a, DA-1b, UA-6b
DC-2	Culvert	DD-1b
DD-1c	Ditch	DC-2, DA-1c
DD-2a	Ditch	DA-2, UA-2DD-3DitchDA-3bDA-2a, UA-2
DD-2b	Ditch	DD-2a, DA-2b
DC-1	Culvert	DD-2b, UA-2
DD-2c	Ditch	DC-1, DA-2c
DC-3	Culvert	DD-2c
DD-3	Ditch	DA-3
DC-4	Culvert	DD-3
DD-4a	Ditch	DA-3aDD-5DA-4a
DD-4b	Ditch	DD-4a, DC-4, DA-4b
DC-20	Culvert	DD-4b
DD-4c	Ditch	Dc-20, DA-4c
DC-9	Culvert	DD-4c
DD-5a	Ditch	DA-5, UA-3DA-5a
DD-65b	Ditch	DD-25a, DD-4, DA-5b
DC-5	Culvert	DD-5b
DD-75c	Ditch	DC-5, DA-5c
DC-10	Culvert	DD-5c, DC-9
DD-6a	Ditch	DC-3, DD-1c, DA-6a

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
DC-6	Culvert	DD-6a
DD-6b	Ditch	DC-6, DA-6b
DD-6c	Ditch	DA-6c
DC-8	Culvert	DD-~~3~~6b, DD-6c
DD-~~8~~7	Ditch	~~DA-6~~DA-7
DC-7	Culvert	DD-7
DD-8a	Ditch	DA-8a
DD-8b	Ditch	DD-8a, DC-7, DA-8b
DD-8c	Ditch	DD-8b, DC-8, DA-8c
DD-9	Ditch	~~DC-8~~DC-10, DD-5c, DA-9
DC-11	Culvert	DD-9
DD-10	Ditch	DA-~~7, DA-8~~10
DC-12	Culvert	DD-10
DD-11	Ditch	~~DD-9, DD-10, UA-6b~~DA-11
DD-12	Ditch	DD-7, UA-6a
~~DD-13~~DD-13a	Ditch	DC-11, DA-13a
DD-13b	Ditch	DD-13a, DD-11
DD-13c	Ditch	DD-13b, DC-12
DD-13d	Ditch	DD-13c, DD-8c, DD-13b
DC-13	Culvert	DD-13d
DD-13e	Ditch	DC-13, DA-13c
DD-14a	Ditch	~~DA-8~~ DA-14a
DD-14b	Ditch	~~DA-4~~DA-14b
DC-14	Culvert	~~DD-2~~DD-14a, DD-14b

Table 6
Runoff Control Structure
Watershed Summary

Structure	Type	Contributing Watersheds/Structures
DD-15a	Ditch	DA-15a
DD-15b	Ditch	DD-15a, DA-15b
~~DC-5Culvert~~~~DD-5, DC-4~~DC-19	Culvert	DD-15b
DD-16a	Ditch	DA-16a
DC-15	Culvert	DD-16a
DD-16b	Ditch	DC-15, DA-16b
DD-17a	Ditch	DA-17a
DC-16	Culvert	~~DD-3, DD-6~~DD-17a
DD-17b	Ditch	~~DC-7~~DC-16, DC-14, DA-17b
DC-17	Culvert	~~DD-7~~DD-17b, DD-16b
DD-18a	Ditch	DA-18a
DC-18	Culvert	~~DD-8, DD-14DC-9Culvert~~DD-18a
~~DD-13~~DD-18b	Ditch	DC-18, DA-18b

DD-12 does not exist.

TABLE 7

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	~~10 yr. / 6 hr. Peak Flow - cfs~~10 yr. / 24 hr. ~~Peak Flow - cfs~~25 yr10yr. / ~~6 hr~~6hr. Peak ~~Flow - cfs~~Flow-cfs	~~100 yr~~10yr. / ~~6 hr~~24hr. Peak ~~Flow - cfs~~Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
UC-1	Culvert	38.67	57.40	42.02	52.32
DD-1a	Ditch	0.22	0.37	0.26	- -
DD-1b	Ditch	0.52	0.91	0.63	- -
DC-2	Culvert	0.52	0.91	0.63	- -
DD-1c	Ditch	0.63	1.10	0.77	- -
DD-2a	Ditch	2.72	7.14	3.84	- -
DD-2b	Ditch	2.81	7.29	3.94	- -
DC-1	Culvert	2.81	7.29	3.94	- -
DD-2c	Ditch	2.85	7.37	3.99	- -
DC-3	Culvert	2.85	7.37	3.99	- -
DD-3	Ditch	0.11	0.21	0.14	- -
DC-4	Culvert	0.11	0.21	0.14	- -
DD-4a	Ditch	0.06	0.11	0.08	- -
DD-4b	Ditch	0.24	0.44	0.30	- -
DC-20	Culvert	0.24	0.44	0.30	- -
DD-4c	Ditch	0.66	1.15	0.81	- -
DC-9	Culvert	0.66	1.15	0.81	- -
DD-5a	Ditch	0.05	0.09	0.06	- -

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	~~10 yr. / 6 hr. Peak Flow - cfs10 yr. / 24 hr. Peak Flow - cfs25 yr~~10yr. / ~~6 hr~~6hr. Peak ~~Flow - cfs~~Flow-cfs	~~100 yr~~10yr. / ~~6 hr~~24hr. Peak ~~Flow - cfs~~Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DD-5b	Ditch	0.16	0.30	0.20	- -
DC-5	Culvert	0.16	0.30	0.20	- -
DD-5c	Ditch	0.45	0.79	0.55	- -
DC-10	Culvert	1.11	1.94	1.36	- -
DD-6a	Ditch	2.94	7.55	4.11	- -
DC-6	Culvert	2.94	7.55	4.11	- -
DD-6b	Ditch	4.54	10.82	6.17	- -
DD-6c	Ditch	1.18	2.40	1.52	- -
DC-8	Culvert	5.72	13.22	7.69	- -
DD-7	Ditch	2.45	4.31	2.99	- -
DC-7	Culvert	2.45	4.31	2.99	- -
DD-8a	Ditch	0.10	0.19	0.12	- -
DD-8b	Ditch	2.91	5.24	3.58	- -
DD-8c	Ditch	6.12	14.03	8.21	- -
DD-9	Ditch	0.04	2.80	1.96	- -
DC-11	Culvert	1.60	2.80	1.96	- -
DD-10	Ditch	2.19	3.73	2.65	- -
DC-12	Culvert	2.19	3.73	2.65	- -
DD-11	Ditch	0.52	0.89	0.63	- -

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	~~10 yr. / 6 hr. Peak Flow - cfs~~10 yr. / 24 hr. ~~Peak Flow - cfs~~25 yr10yr. / 6 hr6hr. Peak Flow - cfsFlow-cfs	~~100 yr~~10yr. / 6 hr24hr. Peak Flow - cfsFlow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DD-13a	Ditch	3.06	5.27	3.72	- -
DD-13b	Ditch	3.58	6.16	4.35	- -
DD-13c	Ditch	5.77	9.89	7.00	- -
DD-13d	Ditch	6.35	14.50	8.51	- -
DC-13	Culvert	6.35	14.50	8.51	- -
DD-13e	Ditch	6.54	14.88	8.75	- -
DD-14a	Ditch	0.23	0.39	0.28	- -
DD-14b	Ditch	0.56	0.95	0.67	- -
DC-14	Culvert	0.79	1.34	0.95	- -
DD-15a	Ditch	0.26	0.44	0.31	- -
DD-15b	Ditch	0.66	1.11	0.79	- -
DC-19	Culvert	0.66	1.11	0.79	- -
DD-16a	Ditch	0.11	0.19	0.14	- -
DC-15	Culvert	0.11	0.19	0.14	- -
DD-16b	Ditch	0.17	0.29	0.21	- -
DD-17a	Ditch	0.31	0.53	0.38	- -
DC-16	Culvert	0.31	0.53	0.38	- -
DD-17b	Ditch	1.15	1.96	1.39	- -
DC-17	Culvert	1.32	2.25	1.60	- -

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	~~10 yr. / 6 hr. Peak Flow - cfs10 yr. / 24 hr. Peak Flow - cfs25 yr~~10yr. / ~~6 hr~~6hr. Peak ~~Flow - cfs~~Flow-cfs	~~100 yr~~10yr. / ~~6 hr~~24hr. Peak ~~Flow - cfs~~Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
DD-18a	Ditch	0.06	0.10	0.07	- -
DC-18	Culvert	~~44~~0.~~40~~06	0.10	~~69~~0.~~11~~07	~~49.4063.16DD-2Ditch2.607.363.75~~ -

Table 7
Runoff Control Structure
Flow Summary

Structure	Type	~~10 yr. / 6 hr. Peak Flow - cfs~~ ~~10 yr. / 24 hr. Peak Flow - cfs~~ ~~25 yr~~10yr. / ~~6 hr~~6hr. Peak ~~Flow - cfs~~Flow-cfs	~~100 yr~~10yr. / ~~6 hr~~24hr. Peak ~~Flow - cfs~~Flow-cfs	25yr. / 6hr. Peak Flow-cfs	100yr. / 6hr. Peak Flow-cfs
~~DD-3Ditch1.042.121.34-DD-4~~DD-18b	Ditch	0.~~551.12~~39	0.~~71-DD-5Ditch~~66	0.~~972.991.45-DD-6Ditch4.1211.4~~7	~~5.91-DD-7Ditch5.1613.597.25-DD-8Ditch3.055.173.69-DD-9Ditch4.177.495.13-DD-10Ditch4.808.225.82-DD-11Ditch10.2218.2912.57-DD-12Ditch5.9016.178.20-DD-13Ditch0.250.520.33-DD-14Ditch1.122.281.44-DC-4Culvert2.607.363.75-DC-5Culvert3.5710.355.20-DC-6Culvert 5.1613.597.25-DC-7Culvert5.1613.597.25-DC-8Culvert4.177.455.13-DC-~~

DD-12 does not exist.
UC-1flow values include 25yr-6hr sediment pond peak flow 31.44 cfs.

TABLE 8

Table 8 Disturbed Ditch Design Summary						
Ditch	DD-~~2~~1a	DD-~~3~~1b	DD-~~4~~1c	DD-~~5~~2a	DD-~~6~~2b	DD-~~7~~2c
Slope (%)	11.42	11.20	10.00	12.~~50~~06	10.29	14.~~6020.7015.305.007.402~~9
Length (ft.)	~~1291788675326~~683	420	~~2052~~0	680	~~337~~350	105
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	~~2~~0.00	~~2~~0.00	~~1.00~~1.00	2.00	2.~~50~~00	2.00
Peak Flow 10/6 (cfs)	~~2.601.040~~.22	0.5~~5~~2	0.~~974.12~~63	2.72	~~5.16~~2.81	2.85
Peak Flow 10/24 (cfs)	~~7~~0.3~~6~~7	~~2~~0.~~12~~91	1.~~122.99~~10	7.14	7.29	~~11~~7.~~47~~37
~~13.59~~Flow Depth (ft.) 10/6	0.2~~2~~0	0.~~120.11 0.17~~27	0.3~~7~~0	0.~~34~~23	0.24	0.22
Flow Depth (ft.) 10/24	0.~~40~~24	0.~~19~~34	0.~~17~~37	0.3~~19~~	0.~~64~~42	0.~~58~~38
Flow Area (ft.^{2}) 10/6	0.~~540.280~~8	0.1~~4~~5	0.~~23~~18	~~1~~0.56	0.61	0.~~021.08~~55
Flow Area (ft.^{2}) 10/24	~~1~~0.11	~~0.45~~0.23	0.~~51~~227	1.~~1~~10	1~~2.1~~18	1.06
Velocity (fps) 10/6	~~4~~2.8~~0~~4	3.~~71~~49	3.~~954.25 4.05~~51	4.~~80~~81	4.61	5.18
Velocity (fps) 10/24	~~63~~.63~~23~~	4.~~73~~02	4.~~935.90 5.43~~04	6.~~43~~49	6.18	6.96
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.						

~~DD-1 does not exsit.~~

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	~~DD-8DD-9DD-10DD-11DD-12DD-13~~DD-3	~~DD-14~~DD-4a	DD-4b	DD-4c	DD-5a	DD-5b	DD-5c
Slope (%)	~~6.90~~0.60	~~3~~11.00	~~4~~10.26	10.00	~~5.906.807~~13.1~~4~~1	~~7~~11.11	9.5~~8~~2
Length (ft.)	~~360~~171	100	~~380~~273	580	~~500425440350330~~183	126	567
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	~~2.002.502.003.0030~~.00	0.00	~~1~~0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	~~3~~0.11	0.06	0.24	0.66	0.05	~~4~~0.~~174.8~~010.2~~25.901~~6	0.~~25~~45
~~1.12~~Peak Flow 10/24 (cfs)	~~5.177.4980.2218.2916.1721~~	0.~~52~~11	0.44	1.15	~~2~~0.~~28~~09	0.30	0.79
Flow Depth (ft.) 10/6	0.~~29~~26	0.12	0.21	0.3~~9~~0	0.~~43~~11	0.~~48~~18	0.~~340.230.222~~7
Flow Depth (ft.) 10/24	0.3~~9~~4	0.~~53~~15	0.~~570.670.602~~6	0.~~3~~38	0.14	0.22	0.33
Flow Area ($ft.^2$) 10/6	0.~~74~~14	~~10.271.2303~~	~~10.921.2509~~	0.1~~09~~	0.~~32~~02	0.06	0.14

Flow Area ($ft.^2$) 10/24	10.23	0.071.911.802.802.05+	0.1814	0.28	0.5404	0.10	0.22
Velocity (fps) 10/6	40.1379	32.2902	2.79	3.915.334.7155	2.4606	2.59	3.4717
Velocity (fps) 10/24	40.8593	2.35	3.9324	4.576.346.4308	2.9539	3.04	3.65
4.24Rip-Rap Req'd (Y/N)	N	N	N	YN	N	N	N
Rip-Rap D_{50}	-	-	-	6"	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 98 (Continued)

Table 98 (Continued) Disturbed CulvertDitch Design Summary							
CulvertDitch	DC-4DD-6a	DC-5DD-6b	DC-6DD-6c	DCD-7	DC-8DD-8a	DC-9DD-8b	DD-8c
Slope (%)	5.005.005.00018.00	32.0056	3.0038	1.08	20.42	7.81	10.34
Length (ft.)	40200	507	532	370	284	666	406040404040406
Manning's No.	0.025040	0.035	0.0235	0.0235	0.0235	0.0235	0.025040
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	1.00	1.00	1.00	0.00	1.00	2.00
Peak Flow 10/6 (cfs)	2.603.575.165.1694	4.1754	1.18	2.45	0.2510	2.91	6.12
Peak Flow 10/24 (cfs)	7.3655	10.3582	13.5913.5972.4540	4.31	0.5219	5.24	Min14.Diam.Req'd03
Flow Depth (ft.) 10/6	0.840.951.0919	0.991.1060	0.3828	Min0.Diam.Req'd55	0.13	0.37	0.41
Flow Depth (ft.) 10/24	0.32	0.90	0.41	0.72	0.17	0.49	0.63
Flow Area ($ft.^2$) 10/6	0.62	1.2432	0.45	1.15	0.03	0.63	1.14
Flow Area ($ft.^2$) 10/24	1.4117	2.52	0.75	1.561.431.3775	0.5106	Diam0.Proposed (ft.)1.501.5098	2.002.001.501.5007
Velocity (fps) 10/6	4.6971	3.43	2.64	2.12	2.90	4.59	5.085.576.654.362.1635

Velocity (fps) 10/24	6.~~09~~47	4.29	3.21	2.46	3.40	5.37	6.~~63~~78
~~7.10~~Rip-Rap Req'd (Y/N)	~~8.47~~Y	~~5.04~~N	~~2.59~~N	N	N	N	Y
Rip-Rap D_{50}	~~N/A~~6"	-	-	-	-	-	6"
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued)
Disturbed Ditch Design Summary

Ditch	DD-9	DD-10	DD-11	DD-13a	DD-13b	DD-13c	DD-13d
Slope (%)	10.00	3.02	5.06	2.53	3.23	3.30	1.25
Length (ft.)	50	696	336	474	62	38	278
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	0.00	1.00	0.00	1.00	1.00	1.00	3.00
Peak Flow 10/6 (cfs)	0.04	2.19	0.52	3.06	3.58	5.77	6.35
Peak Flow 10/24 (cfs)	0.07	3.73	0.89	5.27	6.16	9.89	14.50
Flow Depth (ft.) 10/6	0.11	0.40	0.32	0.50	0.51	0.63	0.57
Flow Depth (ft.) 10/24	0.13	0.53	0.39	0.65	0.66	0.82	0.89
Flow Area ($ft.^2$) 10/6	0.02	0.73	0.20	0.99	1.02	1.44	2.36
Flow Area ($ft.^2$) 10/24	0.03	1.08	0.30	1.48	1.52	2.15	4.25
Velocity (fps) 10/6	1.76	3.00	2.59	3.08	3.51	4.01	2.69
Velocity (fps) 10/24	2.03	3.46	2.97	3.55	4.05	4.61	3.41
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-
Note: Slope/Lengths from Plate 7-2.							

TABLE 8 (Continued)

Table 8 (Continued)
Disturbed Ditch Design Summary

Ditch	DD-13e	DD-14a	DD-14b	DD-15a	DD-15b	DD-16a	DD-16b
Slope (%)	4.78	8.72	3.15	9.70	4.07	2.97	6.06
Length (ft.)	460	390	540	525	270	370	165
Manning's No.	0.035	0.035	0.035	0.035	0.035	0.035	0.035
Side Slope (H:V)	2:1	2:1	2:1	2:1	2:1	2:1	2:1
*Bottom Width (ft.)	3.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak Flow 10/6 (cfs)	6.54	0.23	0.56	0.26	0.66	0.11	0.17
Peak Flow 10/24 (cfs)	14.88	0.39	0.95	0.44	1.11	0.19	0.29
Flow Depth (ft.) 10/6	0.40	0.21	0.36	0.22	0.36	0.20	0.20
Flow Depth (ft.) 10/24	0.63	0.26	0.43	0.26	0.44	0.24	0.25
Flow Area ($ft.^2$) 10/6	1.52	0.09	0.25	0.09	0.26	0.08	0.08
Flow Area ($ft.^2$) 10/24	2.68	0.13	0.38	0.14	0.38	0.12	0.12
Velocity (fps) 10/6	4.31	2.59	2.21	2.78	2.54	1.44	2.10
Velocity (fps) 10/24	5.54	2.96	2.52	3.18	2.89	1.65	2.40
Rip-Rap Req'd (Y/N)	N	N	N	N	N	N	N
Rip-Rap D_{50}	-	-	-	-	-	-	-

Note: Slope/Lengths from Plate 7-2.

TABLE 8 (Continued)

Table 8 (Continued) Disturbed Ditch Design Summary							
Ditch	DD-17a	DD-17b	DD-18a	DD-18b			
Slope (%)	2.68	4.12	2.86	3.54			
Length (ft.)	485	97	175	650			
Manning's No.	0.035	0.035	0.035	0.035			
Side Slope (H:V)	2:1	2:1	2:1	2:1			
*Bottom Width (ft.)	0.00	0.00	0.00	0.00			
Peak Flow 10/6 (cfs)	0.31	1.15	0.06	0.39			
Peak Flow 10/24 (cfs)	0.53	1.96	0.10	0.66			
Flow Depth (ft.) 10/6	0.29	0.44	0.16	0.30			
Flow Depth (ft.) 10/24	0.36	0.54	0.19	0.37			
Flow Area ($ft.^2$) 10/6	0.17	0.39	0.05	0.18			
Flow Area ($ft.^2$) 10/24	0.26	0.59	0.07	0.27			
Velocity (fps) 10/6	1.80	2.93	1.22	2.11			
Velocity (fps) 10/24	2.05	3.35	1.39	2.41			
Rip-Rap Req'd (Y/N)	N	N	N	N			
Rip-Rap D_{50}	-	-	-	-			
Note: Slope/Lengths from Plate 7-2.							

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-1	DC-2	DC-3	DC-4	DC-5	DC-6
Slope (%)	13.33	10.77	3.03	21.50	12.00	5.00
Length (ft.)	30	65	33	135	50	80
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.81	0.52	2.85	0.11	0.16	2.94
Peak Flow 10/24 (cfs)	7.29	0.91	7.37	0.21	0.30	7.55
Diam. Proposed (ft.)	1.50	1.50	1.50	1.50	1.50	2.00
Velocity (fps) 10/24	10.72	5.31	5.94	4.35	3.95	7.27
Rip-Rap D_{50}	6"	6"	6"	N/A	N/A	6"
Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)						

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-7	DC-8	DC-9	DC-10	DC-11	DC-12
Slope (%)	46.40	38.80	5.70	14.25	4.60	4.00
Length (ft.)	110	85	35	55	65	50
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	2.45	5.72	0.66	1.11	1.60	2.19
Peak Flow 10/24 (cfs)	4.31	13.22	1.15	1.94	2.80	3.73
Diam. Proposed (ft.)	1.50	2.00	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	14.05	17.69	4.55	7.33	5.44	5.60
Rip-Rap D_{50}	12"	12"	N/A	6"	6"	6"
Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)						

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-13	DC-14	DC-15	DC-16	DC-17	DC-18
Slope (%)	3.33	3.33	3.33	3.33	4.00	5.70
Length (ft.)	30	60	60	60	75	35
Manning's No.	0.025	0.025	0.025	0.025	0.025	0.025
Peak Flow 10/6 (cfs)	6.35	0.79	0.11	0.31	1.32	0.06
Peak Flow 10/24 (cfs)	14.50	1.34	0.19	0.53	2.25	0.10
Diam. Proposed (ft.)	2.00	1.50	1.50	1.50	1.50	1.50
Velocity (fps) 10/24	7.34	3.93	2.20	2.99	4.87	2.19
Rip-Rap D_{50}	6"	N/A	N/A	N/A	N/A	N/A
Note: Slope/Lengths from Plate 7-5. Velocity: (Haestad Methods, Flowmaster, Version 6.0)						

TABLE 9

Table 9 Disturbed Culvert Design Summary						
Culvert	DC-19					
Slope (%)	2.50					
Length (ft.)	40					
Manning's No.	0.025					
Peak Flow 10/6 (cfs)	0.66					
Peak Flow 10/24 (cfs)	1.11					
Diam. Proposed (ft.)	1.50					
Velocity (fps) 10/24	3.36					
Rip-Rap D_{50}	N/A					

Note: Slope/Lengths from Plate 7-5.
Source: (Haestad Methods, Flowmaster, Version 6.0)

TABLE 10

Table 10 Undisturbed Culvert Design Summary		
Culvert	UC-1	
Slope (%)	~~54~~.5~~68~~	
Length (ft.)	~~535~~480	
Manning's No.	0.025	
Peak Flow 10/6 (cfs)	~~44~~38.~~40~~67	
Peak Flow 100/6 (cfs)	~~63.16Min. Diam. Req'd (ft.) 10/62~~52.~~39Min. Diam. Req'd (ft) 100/62.72~~32	
Diam. Proposed (ft.)	5.00	
~~Velocity (fps) 10/69.93~~Velocity (fps) 100/6	1~~0~~1.85~~19~~	
* Note: Peak Flows include 25 year - 6 hour design overflow 31.44 cfs from sediment pond.		

DESIGN OF SEDIMENT CONTROL STRUCTURES

Design Specifications:

3.1 Design and Construction Specifications for Sedimentation Pond
3.2 Sediment Yield
3.3 Sediment Pond Volume

Tables:

Table 11	Sediment Pond Design
Table 12a	Sediment Pond #1 - Stage Volume Data
Table 12b	Sediment Pond #2 - Stage Volume Data
Table 13a	Sediment Pond #1 - Stage Discharge Data
Table 13b	Sediment Pond #2 - Stage Discharge Data

3.4 Sediment Pond Summary

Figures:

Figure 5a	Sediment Pond #1 Stage-Volume Curve
Figure 65b	Sediment Pond ~~Stage-Discharge~~#2 Stage-Volume Curve
Figure 6a	Sediment Pond #1 Stage-Discharge Curve
Figure 6b	Sediment Pond #2 Stage-Discharge Curve
Figure 7	~~Removed~~Removal of Culvert UC-1 for Final Reclamation

3.1 Design and Construction Specifications for Sedimentation Pond

a) All construction of sedimentation ponds will be performed under the direction of a qualified, registered professional engineer.

b) The sediment pond #1 will be located in an existing low area where the Right Fork of Lila Canyon passes beneath the existing road. The existing road fill and culvert will be removed, and the pond embankment (road fill) will be reconstructed and compacted. The existing culvert will be replaced with UC-1 which will extend approximately 300' up the Right Fork of Lila Canyon. This culvert will be equipped with an inlet section and trash rack, and will allow undisturbed runoff and treated access road drainage to pass beneath the sediment pond. The majority of the pond will be in an existing channel area, and is therefore considered incised. The embankment will be reconstructed to a maximum of 2h:1v slopes, with the total of inside and outside slopes not less than 5h:1v. The pond will be equipped with a culvert riser principal spillway with an oil skimmer, a decant, and a second culvert riser emergency spillway with an oil skimmer. Both spillways will discharge to the oversized (60") CMP culvert running beneath the pond.

c) The area of pond constructed shall be examined for topsoil, and where present in removable quantities, such soil shall be removed separately and stored in an approved topsoil storage location.

d) In areas where fill is to be placed for the pond impoundment structures, natural ground shall be removed to at least 12" below the base of the structure.

e) Native materials shall be used where practical. Fill will be placed in lifts not to exceed 6" and compacted prior to placement of next lift. Compaction of all fill materials shall be at least 95%.

f) Rip-rap or other protection (culverts, concrete, etc.) will be placed at all ~~inlets and outlets~~pond inlets to prevent scouring. Rip-rap will consist of

substantial, angular (non-slaking) rock material of adequate size.

g) Decanting of the pond, as required, will be accomplished by use of a decant pipe with an inverted inlet as shown on Plate 7-6. Samples will be collected prior to decanting of the pond. If the quality of the water meets the requirements of the U.P.D.E.S. Permit, decanting will proceed. Discharge samples will be collected as per the approved U.P.D.E.S. Discharge Permit.

h) Slopes of the embankments shall not be steeper than 2h:1v, inside or outside, with a total of the inslope and outslope not less than 5h:1v, except where areas of the pond are incised.

i) External slopes of the impoundment will be planted with an approved seed mix to help prevent erosion and promote stability.

j) Top width of the embankment shall be not less than (H+35)/5, where H = Height of Dam in feet.

3.2 Sediment Yield

The Universal Soil Equation (USLE) was used to estimate sediment yield from disturbed areas. All soil loss from this area was assumed to be delivered to, and deposited in the sedimentation pond.

Erosion rate (A) in tons-per-acre-per-year is determined using the USLE as follows:

$$A = (R) (K) (LS) (CP)$$

Where the variables R, K, LS, and CP are defined as follows:

Variable "R" is the rainfall factor which can be estimated from $R = 27P^{2.2}$; where P is the 2-year, 6-hour precipitation value. P for the Lila Canyon area is 0.75" as shown in Figure 5.4, page 315, Barfield, et.al. 1983. Therefore, the estimated value of "R" for this area is 14.34.

Variable "K" is the soil erodibility factor. For disturbed areas, the "K" value is conservatively estimated to be 0.5. For disturbed runoff, but uncompacted and ungraded areas, "K" is estimated at 0.320. "K" is estimated to be 0.035 for undisturbed areas.

Variable "LS" is the length-slope factor. This figure was determined by applying the slope length and percentage for each sub-drainage area to the chart in Figure 5.15, p. 334, "Applied Hydrology and Sedimentology for Disturbed Areas", Barfield, Warner and Haan, 1983.

Variable "CP" is the control practice factor, which can be divided into a cover and practice factor. Values were determined from Appendix 5A, Barfield, et.al., 1983.

Site	CP Factor
Compacted Areas	1.20
Disturbed/Uncompacted Areas	0.20
Undisturbed Areas	0.15

The sediment volume is based on a density of 100 pounds per cubic foot of sediment.

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #1

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	CP	A	Yield
DA-21a	14.34	0.500	20.33	680	22.4535	15201 2.50	7.451. 20	64.101 07.55	0.0720 163
DA-3(total)DA-1b	14.34	0.500	2.9265 00.31	420	1511.43	3.396.5030	1.20	5528.9 339	0.0750 040
DA-41c	14.34	0.500	20.20	225	8.89	1.70	1.20	14.63	3300.0 013
DA-2a	14.34	0.500	0.93	680	23.82	13.00	1.20	111.85	0.0478
DA-2b	14.34	0.500	0.14	350	10.29	2.80	1.20	24.09	0.0015
DA-2c	14.34	0.500	0.10	106	15.10	2.60	1.20	22.37	0.0010
DA-3	14.34	0.500	0.30	7170	9.5841	1.60	1.20	13.77	0.0170 019
DA-54a	14.34	0.500	0.5614	24012.50 100	12.00	1.80	1.20	15.49	0.0010
DA-4b	14.34	0.500	0.12	270	10.37	2.40	1.20	20.65	0.0011
DA-4c	14.34	0.500	0.60	580	9.31	2.70	1.20	23.23	0.0064
DA-5a	14.34	0.500	0.07	180	13.33	2.80	1.20	24.09	0.0008
DA-5b	14.34	0.500	0.33	125	11.20	1.80	1.20	15.49	0.0023
DA-5c	14.34	0.500	0.42	570	9.47	3.00	1.20	25.81	0.00750
DA-6**a	14.34	0.001 500	50.1028	200	55027. 00	9.0950	21.20	81.704	0.010. 0004- 0105
DA-7**DA-6b	14.34	0.001 500	3.35	710	9.21	3.20	1.20	27.53	0.0423

DA-6c	14.34	0.500	2.51	6.867006 90	710.14	3.60	1.20	30.97	0.0357
DA-7	14.34	0.500	2.200. 0168	630	4.76	1.25	1.20	10.76	0.0132
DA-8a	14.34	0.500	0.26	284	19.01	4.80	1.20	41.30	0.0049
DA-8b	14.34	0.500	0.76	670	7.80	2.40	1.20	20.65	0.0072
DA-8c	14.34	0.500	0.95	410	10.24	2.80	1.20	24.09	0.0105
DA-9	14.34	0.500	0.05	50	12.00	1.35	1.20	11.62	0.0003
-DA-10	14.34	0.500	2.89	700	2.86	0.43	0.01	0.03	0.0000
DA-811	14.34	0.500	0.5878	350340	4.70	0.85	1.20	7.31	0.0026
DA-13a	14.34	0.500	1.5097	470	2.55	0.38	0.01	0.03	0.0000
DA-13b	14.34	0.500	0.49	280	1.43	0.22	1.20	12.9189	0.0030 004
DA-13c	14.34	0.500	0.40	460	4.78	1.05	1.20	9.03	0.0017
UA-2	14.34	0.035 500	11.741 0.01	1500	66.67	102.68 75.00	0.15	780.73 66	0.042U A- 314.34 0.0355 .98650 25.392 7.550. 152.07 3707
0.006UA-4	14.34	0.035 7.205 00	124.50 08	1950	47.76	580.50 00	0.15	453.40 0.015U A- 514.34 78	0.3201 2.2760 042.86 34.330 .2031. 510.17 83476
UA-6(total)UA-6a	14.34	0.500	61.45	230	34.760	625815.00	20.45 15	016.20 3.5113	0.0110 107
UA-6b	14.34	0.500	0.40	90	33.33	9.00	0.15	9.68	0.0018

Total Sediment 1 year (ac.ft.) . . . . . 0.~~4269~~491

Total Sediment 3 years (ac. ft.) . . . . . ~~1~~2.~~2788~~8473

* Disturbed Runoff / Uncompacted Area
** Paved Areas

SEDIMENT YIELD CALCULATIONS - USLE - Sediment Pond #2

Drainage	R	K	Acres	Slope Length Feet	Slope (%)	LS	CP	A	Yield
DA-14a	14.34	0.500	0.36	390	8.71	2.25	1.20	19.36	0.0032
DA-14b	14.34	0.500	0.75	540	2.96	0.44	1.20	3.79	0.0013
DA-15a	14.34	0.500	0.38	525	9.52	3.40	1.20	29.25	0.0051
DA-15b	14.34	0.500	0.62	270	4.44	0.62	1.20	5.33	0.0015
DA-16a	14.34	0.500	0.16	370	2.70	0.38	1.20	3.27	0.0002
DA-16b	14.34	0.500	0.09	210	6.19	1.05	1.20	9.03	0.0004
DA-17a	14.34	0.500	0.42	610	3.11	0.50	1.20	4.30	0.0008
DA-17b	14.34	0.500	0.07	100	5.00	0.54	1.20	4.65	0.0002
DA-18a	14.34	0.500	0.07	175	3.43	0.40	1.20	3.44	0.0001
DA-18b	14.34	0.500	0.44	650	3.69	0.65	1.20	5.59	0.0011
Total									0.014

Total Sediment 1 year (ac.ft.) 0.014

Total Sediment 3 years (ac. ft.) 0.042

* Disturbed Runoff / Uncompacted Area

** Paved Areas

3.3 Sediment Pond Volume

The volumes shown in Table ~~11s~~ 11a and 11b are from the volumes calculated from the precipitation, runoff and sediment yield for a 10 year-24 hour precipitation event. The volumes were calculated based on the disturbed areas (and contributing undisturbed areas) runoff values, developed using the design parameters described in this section.

TABLE 11a

Table 11a Sediment Pond #1 Design	
1. Use 1.90" for 10 year - 24 hour event.	
2. Runoff Volume - (from Table 5, ~~10 yr/24 hr~~10yr/24hr) + (8.73 ac *1.01 ac-in /12 in/ft) =	~~54~~.~~09~~68 ac.~~-~~ft.~~-~~ (1)
3. Sediment Storage Volume USLE ~~1.289~~0.9491 ac.ft./yr. x 3 yrs. =	~~1~~2.~~278 ac. ft.4. Direct Precipitation into Pond 1.076 acres x 1.90" / 12 in./ft. = 0.184 ac. ft.~~85 ac-ft
~~5~~4. Total Required Pond Volume ~~54.090 + 1.278~~68 + ~~02.184~~85 =	67.5523 ac.~~-~~ft.~~-~~
65.~~*~~ Peak Flow (25 yr. - 6 hr. event)* =	31.44 cfs (2)
~~7~~6. Pond Design Volume @ Principle Spillway = (See Table 12a)	8.537060 ac.~~-~~ft.~~-~~
* Peak Flow values from Table 5, sum of all contributing watersheds plus possible future flow from UA-~~5~~1.	

(1) Capacity is ~~1~~0.~~03~~73 ac.~~-Ft.-~~ft higher than Table 5. This ~~is to allow for the~~includes flow from ~~UA-5~~undisturbed portion of UA-1 within mine boundary. There is a possibility that ~~UA-5~~the undisturbed area may be needed if the surface facilities were to be expanded.

(2) Peak flow is 7.65 cfs higher that Table 5. This is to allow for flow from UA-5. There is a possibility that UA-5 may be needed if the surface facilities were to be expanded.

TABLE 12a

Table 12a Sediment Pond #1 Stage/Volume Data				
Elevation	Area (ac.)Volume (acsq. ft.)	Acc. Volume (ac. ft.)	Acc. Volume (ac. ft.)	Remarks
5830	.647722620	0.0000	0.000	Bottom of Pond
5831	.686226136	24380	0.6670.66756	
5832	.72540.70629460	27800	1.37320	
5833	31340	30400	1.765790	
5834	33260	0.74632300	2.11964	Sediment Cleanout Level
58345	.807035250	034255	3.7862.90542	Decant
5835.84930.8285836	3.73337240	5836.89270.87136245	4.60426	
5837	.937039320	0.91538280	5.51913	
5838	.9824414000	0.96040360	6.47906	
5839	1.02871.00643550	42475	7.48504	

5840	1.07591.05245700	44625	8.53706	Principal Spillway
5841	1.123047950	1.10046825	9.63714	Emergency Spillway
5842	1.17081.14750200	49075	10.78426	
5843	1.25871.21555000	52600	11.99947	Top of Embankment

TABLE ~~13~~

~~Table 13~~
~~Sediment Pond~~
11b

Table 11b Sediment Pond #2 Design	
1. Use 1.90" for 10 year - 24 hour event.	
2. Runoff Volume - (from Table 5, 10yr/24hr) =	0.39 ac-ft.
3. Sediment Storage Volume USLE 0.014 ac.ft./yr. x 3 yrs. =	0.04 ac-ft
4. Total Required Pond Volume 0.39 + 0.04 =	0.43 ac-ft
5. Peak Flow (25 yr. - 6 hr. event)* =	2.86 cfs
6. Pond Design Volume @ Principle Spillway = (See Table 12b)	0.60 ac-ft
* Peak Flow values from Table 5, sum of all contributing watersheds.	

TABLE 12b

Table 12b Sediment Pond #2 Stage/Volume Data				
Elevation	Area (sq. ft.)	Volume (sq. ft.)	Acc. Volume (ac. ft.)	Remarks
5838	3560	0	0.00	Bottom of Pond
5838.4		1740	0.04	Sediment Cleanout Level
5838.6		2610	0.06	Decant
5839	4205	3882	0.09	
5840	4850	4527	0.19	
5841	5565	5207	0.31	
5842	6280	5922	0.45	Principal Spillway
5843	7055	6667	0.60	Emergency Spillway
5844	7830	7442	0.77	Top of Embankment

TABLE 13a

Table 13a Sediment Pond #1 Stage/Discharge Data			
Head (ft.)	Q (cfs) Weir Controlled	Q (cfs) Orfice Controlled	Q (cfs) Pipe Flow Controlled
0.0	-	-	-
0.2	2.53	15.22	~~7~~495.~~1~~068
0.4	7.15	21.53	~~7~~496.8923
0.6	13.14	26.36	~~75.67~~96.77
0.8	20.23	30.44	~~7~~697.~~4~~331
1.0	28.27	34.04	~~7~~797.~~1~~985
1.2	37.17	37.28	~~7~~798.~~9~~538
1.4	46.84	40.27	~~7~~898.~~6~~991
1.6	57.22	43.05	~~7~~998.~~4~~391
1.8	68.28	45.66	~~8~~099.~~1~~644
2.0	79.97	48.13	~~8~~099.~~8~~997

Note: 1- 25 year - 6 hour flow = 31.44 cfs.
2- Flow will be weir controlled at a head of 1.07' over riser inlet.

Weir Controlled

$Q = CLH^{1.5}$; where: C= 3.0, L= Circumference of Riser = 9.4248', R=1.5'

Orfice Controlled

$Q = C'a\ (2gH)^{0.5}$; where: C= 0.6, a= Area of Riser = 7.0686 ft^2, R=1.5', g= 32.2 ft/sec^2

Pipe Flow Controlled

$$Q = \frac{a\ (2gH')^{0.5}}{(1+Ke+Kb+KcL)^{0.5}}$$; where a = Area of Pipe = 7.07 ft^2, R = 1.5'

H' = Head = H + ~~9~~14.~~25~~ (~~At outlet of~~ Riser) + 0.35 (Slope) + 0.6*4 (barrel height)

Ke = 1.0
Kb = 0.5
Kc = 0.043
L = 70'

TABLE 13b

Table 13b Sediment Pond #2 Stage/Discharge Data			
Head (ft.)	Q (cfs) Weir Controlled	Q (cfs) Orfice Controlled	Q (cfs) Pipe Flow Controlled
0.0	-	-	-
0.2	0.84	1.69	5.81
0.4	2.38	2.39	5.88
0.6	4.38	2.93	5.95
0.8	6.74	3.38	6.02
1.0	9.42	3.78	6.09
1.2	12.39	4.14	6.16
1.4	15.61	4.47	6.22
1.6	19.07	4.78	6.29
1.8	22.76	5.07	6.36
2.0	26.66	5.35	6.42

Note: 1- 25 year - 6 hour flow = 2.86 cfs.

2- Flow will be orifice controlled at a head of 0.57' over riser inlet.

Weir Controlled

$Q = CLH^{1.5}$; where: C= 3.0, L= Circumference of Riser =3.14', R=0.5'

Orfice Controlled

$Q = C'a (2gH)^{0.5}$; where: C= 0.6, a= Area of Riser = 0.79 ft^2, R=0.5', g= 32.2 ft/sec^2

Pipe Flow Controlled

$Q = a (2gH')^{0.5} / (1+Ke+Kb+KcL)^{0.5}$; where a = Area of Pipe = 0.79 ft^2, R = 0.5'

H' = Head = H + 6.0 (Riser) + 0.8 (Slope) + 0.6*2 (barrel height)

Ke = 1.0

Kb = 0.5

Kc = 0.043

L = 160'

3.4 Sediment Pond Summary

a) The sedimentation ponds hasve been designed to contain the disturbed area (and contributing undisturbed area) runoff from a 10 year-24 hour precipitation event, along with 3 years of sediment storage capacity. Runoff to the ponds will be directed by various ditches and culverts as described in the plan.

b) The required volume for ~~the s~~Sediment ~~p~~Pond #1 is calculated at 67.55~~2~~3 acre feet, including 3 years of sediment storage. The ~~existing~~proposed sediment pond size will ~~be~~have a volume of approximately 8.53706 acre feet (at the principal spillway), which is more than adequate. The required volume for Sediment Pond #2 is calculated at 0.43 acre feet, including 3 years of sediment storage. The proposed sediment pond size will have a volume of approximately 0.45 acre feet (at the principal spillway), which is more than adequate.

c) The ponds will meet a theoretical detention time of 24 hours. ~~It is~~Both are equipped with a decant, a culvert principal spillway and a culvert emergency spillway. Any discharge from the ponds will be in accordance with the approved UPDES Permit.

d) The pond inlets will be protected from erosion, and the spillways will discharge into the ~~main drainage~~natural drainages in a controlled manner.

e) The pond ~~is~~s are temporary, and will be removed upon final reclamation of the property.

f) The ponds will be constructed according to the regulations and under supervision of a Registered, Professional Engineer.

DESIGN OF DRAINAGE CONTROL STRUCTURES FOR RECLAMATION

Reclamation Hydrology:

Tables:

Reclamation Hydrology

4.1 General

Upon completion of operations at the Lila Canyon Minesite, the portals will be sealed and backfilled and all structures will be removed except for the sediment ponds, bypass culvert UC-1, reclamation ditches and temporary sediment controls such as silt fences or straw bales.

Any refuse or mine development waste previously deposited under the approved plan will also be left in place. Concrete will be buried beneath at least 2' of non-toxic, non-acid material. Any potentially toxic or acid-forming material buried on site will be covered with a minimum of 4' of material.

The sediment ponds, and all remaining drainage controls will be removed upon completion of Phase II Bond Release.

4.2 Reclamation Area Drainage Control

During the initial phase of reclamation, all drainage controls will be removed with the exception of the two sediment ponds, bypass culvert UC-1, reclaimed ditches RD-1 and RD-2 and temporary sediment controls such as straw bales or silt fences installed in the undisturbed drainages.

As undisturbed drainage culverts are removed, a minimum of two straw bale or silt fence barriers will be installed downstream of each location for sediment control purposes.

Disturbed ~~area ditches DD-10, DD-11 and DD-12 will be cleaned and enlarged as necessary, and redesignated as~~areas will be regraded and reclaimed ditches RD-1 ~~(DD-10 and DD-11) and RD-2 (DD-12), respectively (see Plate 5-6~~and RD-2 will be installed to collect the runoff from the site area and direct it to the outlet structures (see Plate 7-7).

When the vegetation and sediment contribution levels meet requirements for

Phase II Bond Release, a series of at least three straw bale or silt fence barriers will be placed downstream of the sediment pond outlets. All upstream sediment controls will be removed. Reclaimed ditches RD-1 and RD-2 will also be removed, regraded and reseeded. Culvert UC-1 will be cut off at the location of the principal pond spillway.

The portion of culvert UC-1 remaining beneath the road will be left as a permanent drainage control. The culvert will be equipped with an inlet section and rip-rapped headwall. The culvert is adequately sized to safely pass runoff from a 100 year - 6 hour event, as shown in Table 10. To ensure that state of the art technology is incorporated, the final reclamation plans for the sedimentation pond areas will be submitted prior to commencement of final reclamation of this area.

The remainder of culvert UC-1 will be removed, and the natural channel restored through the sediment pond #1 area. The sediment pond structures will also be removed, the pond areas regraded as necessary and reseeded. The pond #1 embankment will remain as a permanent feature, since the existing (and proposed future) road through the area passes over the embankment.

Following the successful establishment of vegetation and when ~~affluent~~effluent standards are met, the sediment ponds will be removed. The same methodologies relative to recontouring, top soil application and seeding will be utilized in grading and revegetating the pond areas as outlined in Chapters 2, 5, and Appendix 5-8.

The pond embankment will be narrowed to facilitate the even character of the Lila Canyon Road. The ~~60~~48 inch bypass culvert (UC-1) will be removed to within six feet of the road embankment. A newly formed channel will be constructed at an approximate four percent grade to intercept the inlet of the culvert at its intersection of the road. The road embankment and associated new channel will be armored by the Operator with an underlayment of filter gravel, with D_{50} -30 inch rip-rap. The new area of disturbance including the newly formed channel will have top soil spread in and around the rip-rap. The Operator will use the same seeding and mulching methods described in Appendix 5-8 will be used on this area as well. See Figures 4 and 7 for a detailed design.

TABLE 14

Table 14 Final Reclamation Drainage Areas Contributing to Structures	
Channel	~~*Contributing~~Contributing Watershed/Structure
RD-1	~~DD-11~~RW-1
RD-2	~~DD-12~~RW-2
UC-1	UA-1, UA-4, RD-1~~, and RD-2~~

~~* Taken from Table 6.~~

TABLE 15

Table 15 Final Reclamation Drainage Structure Flow Summary	
Channel	*100/6 Flow (cfs)
RD-1	1~~1~~3.9~~1~~26
RD-2	1~~2~~0.8~~3~~9
UC-1	~~**65.08~~**72.62

* ~~Antecedent Moisture Condition III~~CN = 83.

** ~~100/6 F~~Combined flow for watersheds UA-1, UA-4, and RW-2.

TABLE 16

Table 16 Final Reclamation Reclamation Structure Design Parameters					
Channel	Bottom Width (ft.)	Side Slope H:V	Slope %	Reclaimed Depth (ft.)	Manning's No.
RD-1	3	2:1	5.00	1.5	0.035
RD-2	3	2:1	10.00	1.5	0.035
UC-1	6048" Diam.	-	5.56	6048" Diam.	0.025

TABLE 17

Table 17 Final Reclamation Reclamation Structure Flow Calculations			
Channel	RD-1	RD-2	UC-1
100 year - 6 hour event (in.)	1.90	1.90	~~10 year - 6 hour event (in.)1.30~~1.90
Peak Flow (cfs)	113.9126	1210.89	72.8365.0862
Velocity (fps)	5.2844	6.8752	123.7734
Required Area (ft.^{2})	2.2644	1.8767	5.1044
Flow Depth (ft.)	0.558	0.473	1.5379

Alternate Sediment Control for Fan Site and Topsoil Storage Area

Sediment Control at the fan and topsoil storage area sites will be accomplished with a combination of one or more of the following: berms, silt fences, and straw bales. The topsoil collected from the fan and topsoil storage area sites will be located ~~down dip~~downslope from the sites and will be used in the construction of the berm. The berm will be constructed a minimum of two feet high and have 2:1 side slopes. The berm will control the flow from a 10 year-24 hour precipitation event. Silt fence will be selectively placed to help control run-off. The berm will be stabilized with vegetation to prevent erosion. As much as practical, the vegetation techniques used on the main topsoil pile will be utilized on the fan topsoil berm.

The outside of the berm will be protected with a silt fence or gravel. The gravel, if used, would help augment the revegetation. Construction details of the silt fence/filter fence are shown if Figure 8.

Due to lack of final engineering details, the exact location of the berm and subsequent erosion techniques will be determined in field with the approval of UDOGM. The final determination will be made prior to the start of topsoil removal.

Run-off Calculations

Fan Site

Acreage:	0.716 acres
Design Storm:10 year/24 hour:	1.90"
CN:	90
S:	1.111

$Q = \frac{(P-0.25S)^2}{P+0.8S}$ = 1.01" of runoff

Total run-off = 0.06 acre feet

Topsoil Storage Area

Acreage:	2.61 acres
Design Storm:10 year/24 hour:	1.90"
CN:	90
S:	1.111

$Q = \frac{(P-0.25S)^2}{P+0.8S}$ = 1.01" of runoff

Total run-off = 0.22 acre feet

Lila Canyon Mine
Watershed Calculations

Lila Canyon Mine
Ditch Calculations

Lila Canyon Mine
Culvert Calculations